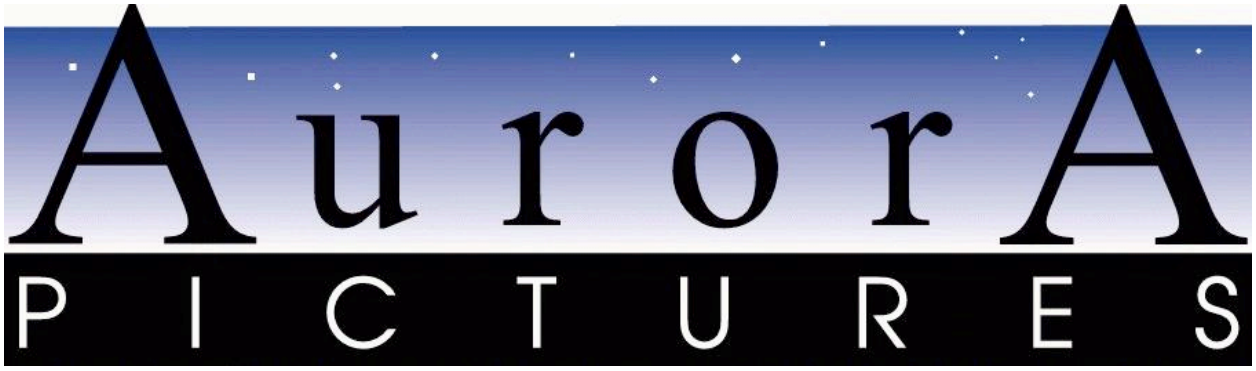

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Overhead Crane Safety

Leader's Guide

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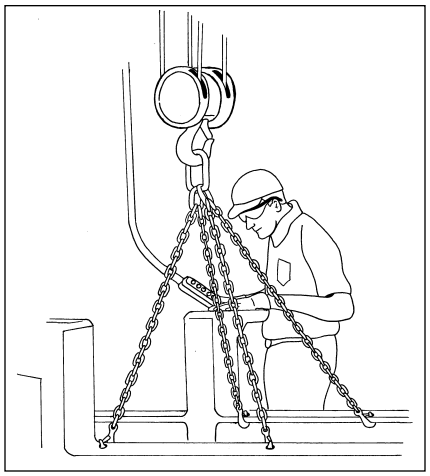
The information contained in this program has been developed in good faith and is believed to present good safety principles. CLMI and all other participating organizations make no representations or warranties as to the completeness or accuracy thereof. Persons using this information must make their own determination as to its suitability for their purposes in support of their own safety programs. CLMI and all other participating organizations are in no way responsible for damages of any nature resulting from the use of this information.

Funding for development of this program has been provided by the Minnesota Job Skills Partnership through the collaborative efforts of Caterpillar Paving Products, Inc., and The Center for Training and Development.

The Center for Training and Development

Introduction



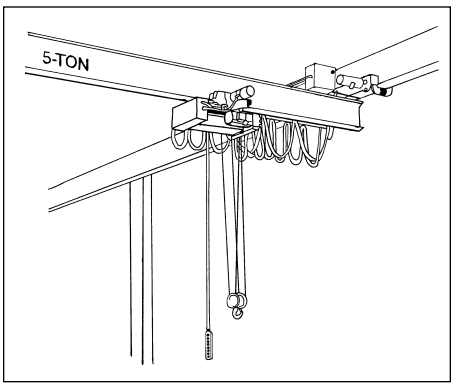
Overhead cranes are commonly used in many production facilities. They allow workers to move large, heavy and bulky parts, as well as components and finished products, with ease and efficiency.

Although overhead cranes are relatively easy to operate, they are complex tools. Operators must be thoroughly trained in their safe operation, including how to rig, lift and move loads.

This Instructor Guide is designed to help you conduct a training session to ensure that your employees understand how to operate overhead cranes safely in your facility. When used with the "Overhead Crane Safety" videotape and PowerPoint presentation, this guide will provide you with a complete basic training session for your employees.

Given the wide variety of cranes, rigging equipment and loads, this program is designed to cover only the basics of safe overhead crane operation and rigging. You should enhance your training session by adding specific information about the cranes, rigging and loads in your facility. In addition, the Field Session portion of the training — designed to provide participants with practical, hands-on training — should focus on the specific needs of your facility.

Topic Overview



In production facilities, overhead cranes are used to move materials from one area to another. Often, the functions that require using a crane are well defined and repetitive. Even so, unsafe operation can cause injury to employees and damage to materials and other property.

To avoid these mishaps, all crane operators should understand how a crane works, how to rig a load and how to lift and move a load safely.

Introduction To Overhead Cranes

Types Of Cranes

An *overhead crane* is a machine that's used to lift, move and lower loads. There are many different types of overhead cranes, each of which can be identified by how it lifts and moves a load. Each overhead crane is rated for the maximum load capacity it's designed to lift.

For example, a typical overhead *bridge crane* has a *bridge* that spans the distance between two rails. The bridge moves back and forth along the rails, powered by an electric motor. A *trolley* runs on top or underneath the bridge and is powered by another electric motor. The trolley moves to position the *hoist* directly over the load to be lifted. The hoist is equipped with a *wire rope* that lowers the *block*, which is equipped with a *hook*. The hook is attached to the load with *slings* or other rigging devices. Wire rope is used on most crane hoists. A chain may be used on lower-capacity hoists.

Overhead bridge cranes can move both vertically and horizontally:

- *Vertically:* The crane can lift and lower the load.
- *Horizontally:* The crane can move in four directions — north, south, east and west — which are usually posted on the underside of the crane and correspond to buttons on the controls. This allows the crane to pick up, move and lower loads in required areas throughout the facility.

A second type of crane, the *monorail crane,* has a hoist suspended from a single girder or I-beam. This type of crane is limited to a single plane of horizontal movement.

The *jib hoist* is another common type of overhead crane. It's smaller than the rail-type cranes and generally has a lower lifting capacity. A jib hoist consists of a single vertical support column and a cantilevered I-beam that supports the hoist unit. A jib hoist can swing horizontally in an arc, which is defined by the length of the I-beam.

All these types of cranes are operated by a *control pendant* that hangs from the hoist. Buttons on the panel control the movement of the crane. In some cases, large overhead cranes have a *cab* in which the operator sits to operate the controls.

Overhead Crane Inspection

Overhead cranes must be inspected before each use or at the beginning of each shift to make sure the controls and operating mechanisms are in proper working order. This inspection should cover these elements:

- Check the hoist upper-limit switch/device to make sure it's operating properly. To do so, raise the block to its highest position, and then make sure the hoist shuts down before the block reaches the hoist.
- If the crane is so equipped, inspect all lines, valves and other parts of air systems for leakage.
- Check hooks for cracks, deformation and damage.
- If the hoist uses wire rope, inspect the hoist rope for kinking, crushing, corrosion and other damage, including broken wires in the wire hoist ropes.
- Inspect the hoist chain for nicks, gouges, distortion, wear, corrosion and other damage.

All wire ropes and chains should be inspected monthly by lowering the hook block to its lowest attainable position and then inspecting the rope or chain for any damage that might cause a loss of strength.

If the inspection reveals damage of any kind or that the crane is not operating properly, the problem must be reported immediately to the facility maintenance department or supervisor. In addition, the crane cannot be operated until the problem has been resolved.

Overhead Crane Operation

The operator is responsible for the safe operation of the crane. This means that he or she must be aware of the potential hazards — both to people and equipment — that may result from crane operation. The operator must be alert and aware of the crane, the rigging, the load and the surrounding area. The crane must be operated in the safest manner possible at all times.

Some facilities have more than one bridge crane on a single set of girder rails. It's very important for operators to know where each crane on the rails is located prior to the lift. In some cases, two operators may unknowingly move loads toward each other, resulting in a collision. In other cases, a crane may be moved quickly from one end of the shop to the other and directly into another operator's path without warning.

To pick up a load, the crane operator uses the buttons on the control pendant to move the crane into location directly over the load and then to operate the hoist and lower the block. The load is then attached to the hook, which hangs from the block. Once it's securely attached, the load is lifted, moved to the desired location, lowered and then unhooked.

A variety of methods can be used to attach the load to the hook, depending on the size, weight and center of gravity of the load. (See the "Rigging" section on pages 7–10.)

Before attaching a load, the operator must make sure that it doesn't exceed the *rated capacity* of the crane — that is, the maximum weight the crane is intended to lift. The rated capacity of the crane can be found on the bridge or control pendant of a rail-type crane and on the I-beam of a jib hoist.

If the operator doesn't know the weight of the load to be lifted, he or she should use a dynamometer to measure it. First, the identification tag of the lifting device should be checked for its *Working Load Limit (WLL),* and then the indicator on the dynamometer should be carefully watched. If the weight of the load approaches the WLL of the rigging, the load must be set down and a sling or other lifting device with a higher load limit must be used. The operator should never risk overloading the crane.

The terms rated capacity *and* Working Load Limit (WLL) *both refer to the maximum weight that should be lifted. The difference between the two is that* rated capacity *refers to the crane itself, whereas* WLL *refers to the rigging.*

The operator also needs to make sure that the load is stable before lifting. For instance, the load must not be likely to collapse or to drop any materials when lifted or moved. Also, the load must be stable enough not to collapse or tip when it's set down and the slings are removed.

Before attaching the load, the operator should check out where it will be moved and placed. The path the load will travel must be clear, and the area where the load will be placed must be prepared for it.

When attaching a load, the operator should make sure the hoist rope or chain is free of kinks and twists and that it isn't wrapped around the load. The load can then be attached to the hook using slings or other lifting devices. (Again, see the "Rigging" section on pages 7–10.)

Once it's been attached, the load must be secured and properly balanced. The hook should be positioned above the center of gravity of the load to minimize swinging. The operator should make sure that there is no slack in and no jerking of the hoist rope/chain at the start of the lift. He or she should also make sure that no people or obstacles are in the path of the load.

Finally, the operator can start to lift the load smoothly and slowly. He or she should apply power steadily to avoid jerking the load.

A load should always be lifted vertically — never pulled from the side. Moreover, a load should be raised only high enough to clear any items in the path of travel — not higher. Doing so will reduce the likelihood of damage to materials on the ground, in the event that an equipment failure causes the load to fall.

A lifted load should *never* be left unattended. Also, a load must be unhooked after it's been lowered into position. A load that remains on the hook might tip if another crane bumps into the crane the load is attached to.

The operator must be aware of how much the crane will travel *after* the control button has been released — in other words, how far it will move after the operator has hit the button to stop it. The amount of travel can vary greatly from crane to crane, and the weight of the load and the amount of rope suspending the load must be considered in each case.

In sum, the crane should always be operated slowly and smoothly, and the operator must allow enough time and space to stop and bring the load safely into the desired position for lowering.

Once the crane has come to a stop and the load has been stabilized, the operator should slowly lower the load. Once the load has reached the ground, the lifting devices should be removed. Finally, the hoist (including the hook attached to the hoist) should be lifted high enough off the ground so that no one will run into it.

The buttons on the control pendant usually include the following:

- On
- Off
- Up
- Down
- North
- South
- East
- West

The directions indicated on the control buttons may not necessarily correspond exactly to the compass directions in your facility. That means it's important for the operator to know the *actual direction* the crane will move when each button is pushed. Since each crane may be different, the operator should take the time to become familiar with each crane and its controls before lifting a load.

Some cranes have two-speed motors, which allows them to start out slowly and then pick up speed. In addition, some cranes have a button that will operate them at two speeds. Pushing the button slightly will allow for a slower speed, and pushing the button down all the way will allow for a faster speed.

Because of the potential danger in lifting and moving loads, crane operators must stay alert and focused on the crane's operation at all times. In addition, they should follow these guidelines for safe operation:

- Never move a crane until the following have been determined:
  - — No other cranes will come into contact with the crane being operated.
  - — No obstacles are in the path of the crane and/or load.
  - — No personnel are in the path of the load or will be under the load when it's raised.
  - — The area in which the load is to be placed is clear and prepared to receive the load.
  - — The crane and rigging have been inspected.
- Never use the crane for side-pulling a load. A load must always be lifted and lowered vertically.
- Never exceed the crane's rated capacity.
- Inspect the crane before use and at the beginning of each shift.

- Use only certified and tested lifting devices.
- Raise and secure the crane and its hoist/hook well above head level when leaving it unattended so as to prevent people from bumping their heads on it.
- Never leave a load suspended during a work break.
- Never operate a crane if a "DO NOT OPERATE" tag is attached to it.
- Don't allow anyone to ride on a crane.
- Always leave the control pendant in a safe place when not using it. If it's left in a traffic aisle, it might be damaged by a forklift or other equipment.
- Know the specific location of the power disconnect for the crane, in the event that an emergency shutdown is required.

Rigging

Rigging refers to how the load is attached to the hook of the crane. The most common type of rigging is a *sling,* which can be made of chain, nylon, wire rope or wire mesh.

A sling must be rated to hold the weight of the load. The *Working Load Limit (WLL)* of a sling can be found on the identification tag attached to it by the manufacturer. The WLL takes into consideration the normal wear of the sling and lifting hardware.

The standard chain sling configuration usually consists of two or more legs that are affixed on one end to a master link or ring with some type of attachment, usually a hook, affixed to the opposite end.

A nylon sling consists of a length of nylon fabric with fittings or loops on both ends. A continuous nylon sling is a single sewn loop that can be configured in a variety of ways.

A wire rope sling is sometimes used when lifting sharp or abrasive materials.

A wire mesh sling is made up of a length of wire mesh with openings for attachments at both ends.

Engineered lifting devices are specialized types of equipment designed to simplify the rigging of equipment, parts and fixtures. Typically, the lifting device is specifically designed to attach to a known part in a manufacturing operation, so using it can speed up the rigging process and improve rigging safety.

An engineered lifting device must be designed by a competent individual who can certify that it will not fail under the anticipated load and working conditions. In addition, any such device must be prooftested with a weight that equals 125% of the WLL. Many manufacturers prooftest their devices to 2 times the WLL.

Shop-made lifting devices — made out of bolts, mild steel, scrap and the like — are often introduced into work facilities. Workers with good intentions may use these devices to solve immediate rigging needs. But these devices often fail without notice, resulting in falling loads, damaged parts and equipment and potentially severe injuries.

Whenever a shop-made device is discovered in the work area, it must be removed from service. Additionally, workers who are tempted to make or use these devices must be advised of the potential dangers of rigging with them.

Slings must be inspected before use to check on the following:

- *Chain Slings*
  - — Before inspecting, clean chains with a nonacid/noncaustic solvent so as to make marks, nicks, wear and other defects clearly visible.
  - — Inspect chains for these problems:
    - – Twists or bends
    - – Nicks or gouges
    - – Excessive wear at bearing points
    - – Stretching
    - – Distorted or damaged master links, coupling links or attachments, especially spread in the throat openings of hooks
  - — Mark any damage plainly with a tag, and remove the chain from service until it's been properly repaired.
- *Nylon Slings*
  - — Inspect them for these problems:
    - – Holes, tears, cuts, burns, snags or embedded particles
    - – Any exposure of red warning yarn (Red yarn is woven through the core of the sling material, and it is exposed when the sling becomes damaged or worn. If it's visible, the sling must be removed from service.)
    - – Broken or worn stitching in load-bearing splices
    - – Excessive wear or elongation exceeding the amount recommended by the manufacturer
    - – Knots in any part of the sling
    - – Distortion, excessive pitting, corrosion or broken fittings
    - – Other apparent defects that cause doubt as to the strength of the sling

- *Wire Rope Slings*
  - Inspect them for these problems:
    - Broken wires, kinks or distortion of the rope
    - Welding damage or burns
    - Any other apparent defects that cause doubt as to the strength of the sling
- *Wire Mesh Slings*
  - Inspect wire mesh slings for these problems:
    - A broken weld or a broken brazed joint along the sling edge
    - Wear as shown by nicks, cracks, breaks, gouges, stretch, bends or weld spatter on the chain or attachments
    - A broken wire in any part of the mesh
    - Reduction in wire diameter of 25% due to abrasion or 15% due to corrosion
    - Lack of flexibility due to distortion of the mesh
    - Visible distortion or cracks in the end fittings
    - Chain links and attachments that don't hinge freely with adjacent links
    - A 15% reduction of the original cross-sectional area of metal at any point around the hook opening or end fitting
    - Discoloration from excessive temperature

Many other devices can be used to attach the load to the crane:

- *Eyebolts* attach directly to the load.
- *Foundry hooks* are used to attach a sling to a load.
- *Hoist rings* can be attached to a load to allow the attachment of hooks.
- *Lift magnets* can be used with loads made of low-carbon steel.
- *Lifting beams* and *spreader bars* provide safer rigging alternatives by reducing sling angles or by providing better rigging to attachment points on the load. Lifting beams can also be used to distribute the weight of a large load to multiple cranes.
- *Plate clamps* are clamped to the load and provide an attachment for the hook.
- *Shackles* are used to attach two or more slings to the hook.

Safety is the major factor when rigging a load. The first step is to determine the *weight of the load* and to use rigging that's rated for that weight. The *Working Load Limit (WLL)* can be found on the identification tag of a sling or other lifting device.

Next, the *center of gravity* of the load must be determined. This is the point on the load at which it will balance properly when lifted. The center of gravity is not necessarily at the center of the load. When a load is lifted from any point other than the center of gravity, additional stress is placed on the sling and the crane, and the load might shift when being raised.

If the center of gravity is unknown, the operator should make a good estimate. Based on that estimate, he or she should attach the appropriate lifting device. The next step is to *slowly* lift the load. If the load starts to swing in any direction, it isn't in balance. If that's the case, it should be lowered and the slings should be adjusted to center the load accurately on the crane.

The *sling angle* refers to how much the sling varies to horizontal. If the sling is straight up and down, it is 90° to horizontal. The lower the sling angle, the higher the tension in the sling. A good operating practice is to keep the sling angle above 45°; sling angles of 60° to 90° are preferred.

Specific safety precautions must be taken when using lifting devices:

- *Slings*
  - — Use a sling rated for the expected load. (In some rigging situations, the load may place increased stress on the rigging. If that's the case, slings and rigging devices rated for higher capacities should be used.)
  - — Use a sling that lifts the load high enough to clear obstructions on the ground.
  - — Make sure the sling hooks have safety latches installed.
  - — When using a nylon sling, make sure it grips the load. Put the sling around the load so it won't slip.
  - — When using a wire mesh sling, don't let the sling twist or bend.
- *Eyebolts*
  - — Never used bent, damaged, worn or rusted eyebolts.
  - — Make sure the angle of the pull on an eyebolt is vertical so as to avoid bending or breaking it.
  - — Make sure the eyebolt is completely seated into the part.
- *Lift Magnets*
  - — Make sure the working face of the magnet is in good condition.
  - — Make sure the lifting face and the load are free of any debris (such as metal chips, scrap, etc.) or excessive oil.
  - — Make sure the lift magnet is properly seated on the load.
- *Lifting Beams*
  - — Use a lifting beam with a rated capacity that's adequate for the load.
  - — Make sure the load is rigged as evenly as possible by placing the hooks in the correct locations on the beam.
- *Plate Clamps*
  - — Make sure the load can be inserted all the way into the throat opening of the clamp.
  - — Never attach a plate clamp to an oily surface.
  - — Never lift more than one sheet of material at a time; doing so can cause material to be dropped from the clamp.
  - — Use as many clamps as necessary to balance the load.
  - — Don't bump the load during lifting or moving, as it could cause the clamps to release.
  - — Never remove a clamp until the load is at rest and fully supported.

Putting On The Training Program

If you have never put on a training program before, there are some helpful hints near the end of this guide (see pages 47–49).

Training is an important way to make sure all crane operators understand how to safely operate the cranes and lifting devices in your facility and how to prevent accidents and injuries.

Upon completion of the program, participants will be able to do these things:

- Understand the types of cranes and lifting devices in your facility
- Safely operate cranes and lifting devices
- Safely rig loads for lifting

Everyone learns in a different way. Some of your employees may learn quickly from the videotape, classroom discussion and Field Session. Others may need more time and attention. Take time to answer all questions and clarify the information.

Be sure to keep accurate records of all overhead crane training. For each participant, identify the date of training, the instructor and the information covered.

Using This Instructor Guide

This Instructor Guide will allow you to present two training sessions:

- A 1- to 2-hour *Classroom Session* with the "Overhead Crane Safety" videotape. The videotape presents information on the following topics:
  - — Overview of overhead cranes
  - — How to inspect overhead cranes and lifting devices
  - — How to safely operate overhead cranes
  - — How to rig loads safely
- A *Field Session* designed to provide participants with these experiences:
  - — Hands-on practice in crane operation, inspection and rigging
  - — Familiarity with the specific equipment, loads and requirements in your facility

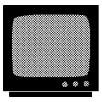
These sessions may be combined or presented separately. However, the Field Session is best conducted on an individual or small-group basis in order to reduce the amount of down time for employees.

This Instructor Guide contains the following symbols to help you conduct the session:

This symbol indicates that you should use the flipchart.

This symbol indicates that you should ask a question.

This symbol indicates that you should add specific information about your facility.



This symbol indicates that you should show the videotape.

This symbol indicates that you should show an overhead.

This symbol indicates that you should read the note for the instructor.

Program Preparation

The best way to ensure that you will conduct a successful training session is to be fully prepared. Here are some important preparation steps for the two sessions:

Classroom Session

1. Identify the location of the room in which you will conduct the training. Ideally, the room should be quiet, well ventilated and well lit.

2. Schedule the session, and send out notices to managers and participants.

3. Assemble the following materials (some will be optional, depending on your presentation plans):
   - TV and VCR
   - Videotape
   - *OPTIONAL*: Computer, PowerPoint presentation, projector and screen
   - Pencils, flipchart, markers
   - Samples of rigging used in your facility (e.g., slings)
   - Copies of the Learning Exercise (found at the end of this guide)

4. Review all program materials thoroughly. Make notes of examples or discussion questions that pertain to your situation. Anticipate questions that participants are likely to ask.

5. Read through the Learning Exercise. You may want to add additional questions to verify that participants understand the unique hazards and procedures in your facility.

6. Consider how you want to present the Learning Exercise. The purpose of the exercise is to check for understanding. It can be used as part of a group discussion, completed in small groups or filled out by individuals. It is not recommended that the exercise be used as a test.

7. Practice presenting the program.

Here are some final steps to help you prepare for conducting the Classroom Session:

1. Prepare all materials, and test the TV and VCR equipment with the videotape at least 1 hour before the session. This will allow time for any last-minute maintenance of the equipment.
2. Cue up the program so it's at the start point.
3. Have the words "Overhead Crane Safety" displayed on a flipchart. This will focus participants on the topic to be discussed.
4. Write the session agenda on a flipchart. This will help participants follow along.

Field Session

1. Identify the area in the workplace where you will conduct the Field Session. Select an area that provides enough room and privacy to conduct the session without distractions yet is realistic enough to allow participants to practice in an actual work situation. If your facility has multiple types of overhead cranes, you may want to conduct parts of the Field Session at the various crane areas.

2. Schedule the session, and send out notices to managers and participants.

3. Assemble the following materials (some will be optional, depending on your presentation plans):
   - Lifting devices
   - Sample loads for practice
   - Samples of damaged equipment for inspection practice

4. Review all program materials thoroughly. Make notes of examples or discussion questions that pertain to your situation. Anticipate questions that participants are likely to ask.

5. Practice presenting the Field Session.

Delivery: Classroom Session

Welcome & Introduction

Welcome participants to the training session.

Show Overhead #1, "Overhead Crane Safety" (or write the session title on a flipchart).

Introduce the topic "Overhead Crane Safety."

Show Overhead #2, "Agenda" (or write the agenda on a flipchart).

Describe the agenda for the session:

- Introduction
- "Overhead Crane Safety" Video:
  - — Part 1: Overhead Crane Overview
  - — Part 2: Overhead Crane Inspection
  - — Part 3: Overhead Crane Operation
  - — Part 4: Rigging
  - — Part 5: Review
- Review Of Operator Responsibilities
- Learning Exercise
- Close

A discussion section follows presentation of each part of the video.

Post the agenda so participants can follow along during the session.

Explain that although overhead cranes are relatively easy to operate, they are complex tools. Operators must be thoroughly trained in their safe operation, including how to rig, lift and move loads. By knowing how to inspect and safely operate cranes and lifting devices, we can all prevent injuries and accidents in our workplace.

ASK: How do we use cranes in our workplace?

Listen to responses.

"Overhead Crane Safety" Video,
Part 1: Overhead Crane Overview

Explain that we will now watch Part 1 of a videotape on overhead crane safety. As they watch, ask participants to look for the following topics:

- How overhead cranes work
- The parts of an overhead crane
- How an overhead crane moves

Show Part 1 of the videotape.

ASK: Does anyone have any questions?

Respond to questions.

Discussion Of Overhead Crane Overview

ASK: What are overhead cranes used for?

Listen to responses.

Show Overhead #3, "Uses Of Overhead Cranes."

Explain the following:

- Overhead cranes are used to lift, move and lower loads.
- There are many different types of overhead cranes, each of which can be identified by how it lifts and moves a load.
- Each overhead crane is rated for the maximum load capacity it's designed to lift.

Explain the following about the overhead cranes in your facility:

- The specific types used
- How they are used
- What types of loads they are used for

Show Overhead #4, "Overhead Bridge Crane Components."

Explain the following:

- A typical overhead bridge crane has a bridge that spans the distance between two rails.
- The bridge moves back and forth along the rails, powered by an electric motor.
- A trolley runs on top or underneath the bridge and is powered by another electric motor.

Show Overhead #5, "Overhead Bridge Crane Components (cont.)."

Explain the following:

- The trolley moves to position the hoist directly over the load to be lifted.
- The hoist is equipped with a wire rope that lowers the block, which is equipped with a hook.
- The hook is attached to the load with slings or other rigging devices.
- Wire rope is used on most crane hoists; a chain may be used on lower-capacity hoists.

ASK: In what directions can an overhead bridge crane move?

Listen to responses.

Show Overhead #6, "Overhead Bridge Crane Movement."

Explain the following:

- Overhead bridge cranes can move both vertically and horizontally:
  - — *Vertically:* The crane can lift and lower the load
  - — *Horizontally:* The crane can move in four directions — north, south, east and west — which are usually posted on the underside of the crane and correspond to buttons on the controls.
  - — This allows the crane to pick up, move and lower loads in required areas throughout the facility.

Show Overhead #7, "Overhead Monorail Cranes."

Explain the following:

- A monorail crane has a hoist suspended from a single girder or I-beam.
- This type of crane is limited to a single plane of horizontal movement.

Show Overhead #8, "Jib Hoists."

Explain the following:

- Another type of crane is the jib hoist.
- It's smaller than the rail-type cranes and generally has a lower lifting capacity.
- A jib hoist consists of a single vertical support column and a cantilevered I-beam that supports the hoist unit.
- Jib hoists can swing horizontally in an arc, which is defined by the length of the I-beam.

Explain the specific movements of the different types of cranes used in your facility.

Show Overhead #9, "Control Pendant."

Explain the following:

- All of these types of cranes are operated by a control pendant that hangs from the hoist.
- Buttons on the panel control the movement of the crane.
- In some cases, large overhead cranes have a cab in which the operator sits to operate the controls.

Explain the specific elements of the overhead cranes in your facility (especially how they differ from the above description).

"Overhead Crane Safety" Video, Part 2, Overhead Crane Inspection

Explain that we will now watch Part 2 of the videotape. As they watch, ask participants to look for the following topics:

- When overhead cranes must be inspected
- What should be inspected
- What problems to look for

Show Part 2 of the videotape.

ASK: Does anyone have any questions?

Respond to questions.

Discussion Of Overhead Crane Inspection

ASK: When should overhead cranes be inspected?

Listen to responses.

Show Overhead #10, "Overhead Crane Inspection."

Explain that overhead cranes must be inspected before use or at the beginning of each shift to make sure the controls and operating mechanisms are in proper working order.

Show Overhead #11, "Inspection Items."

Explain that an inspection must cover these elements:

- Check the hoist upper-limit switch/device to make sure it's operating properly.
  - — To do so, raise the block to its highest position.
  - — Then make sure the hoist shuts down before the block reaches the hoist.
- If the crane is so equipped, inspect all lines, valves and other parts of air systems for leakage.

Show Overhead #12, "Inspection Items (cont.)."

Explain that an inspection must also cover these elements:

- Check hooks for cracks, deformation and damage.
- If the hoist uses wire rope, inspect the hoist rope for kinking, crushing, corrosion and other damage, including broken wires in the wire hoist ropes.
- Inspect the hoist chain for nicks, gouges, distortion, wear, corrosion and other damage.

Show Overhead #13, "Wire Rope And Chain Inspection."

Explain that all wire ropes and chains should be inspected monthly by lowering the hook block to its lowest attainable position and then inspecting the rope or chain for any damage that might cause a loss of strength.

Show Overhead #14, "If You Find A Problem."

Explain the following:

- If the inspection reveals damage of any kind or that the crane is not operating properly, the problem must be reported immediately to the facility maintenance department or supervisor.
- In addition, the crane cannot be operated until the problem has been resolved.

Explain any specific inspection requirements for overhead cranes in your facility, including the following:

- Required daily, weekly, monthly and annual inspections
- Specific items that must be inspected
- Specific problems to look for
- Procedures for reporting damage

"Overhead Crane Safety" Video, Part 3, Overhead Crane Operation

Explain that we will now watch Part 3 of the videotape. As they watch, ask participants to look for the following topics:

- Steps for safely moving a load with a crane
- Guidelines for safe crane operation

Show Part 3 of the videotape.

ASK: Does anyone have any questions?

Respond to questions.

Discussion Of Overhead Crane Operation

ASK: Who is responsible for the safe operation of the crane?

Listen to responses.

Show Overhead #15, "Operator Responsibility."

Explain the following:

- The operator is responsible for the safe operation of the crane.
- This means the operator must be aware of the potential hazards to equipment and people that may result from the crane's operation.
- The operator must be alert and aware of the crane, the rigging, the load and the surrounding area.
- The crane must be operated in the safest manner possible at all times.

Show Overhead #16, "Multiple Cranes."

Explain the following:

- Some facilities have more than one bridge crane on a single set of girder rails.
- It's very important for operators to know where each crane on the rails is located prior to the lift.

ASK: What are the potential hazards of multiple crane use?

Listen to responses.

Explain the following:

- In some cases, two operators may unknowingly move loads toward each other, resulting in a collision.
- In other cases, a crane may be moved quickly from one end of the shop to the other and directly into another operator's path without warning.

Show Overhead #17, "Basic Steps Of Crane Operation."

Explain the following:

- To pick up a load, the crane operator uses the buttons on the control pendant to move the crane into location directly over the load and then to operate the hoist and lower the block.
- The load is then attached to the hook, which hangs from the block.
- Once it's securely attached, the load is lifted, moved to the desired location, lowered and then unhooked.

Show Overhead #18, "Before Attaching A Load."

Explain the following:

- Before attaching a load, the operator must make sure that it doesn't exceed the *rated capacity* of the crane — that is, the maximum weight the crane is intended to lift.
- The rated capacity of the crane can be found on the bridge or control pendant of a rail-type crane and on the I-beam of a jib hoist.

Show Overhead #19, "Using A Dynamometer."

Explain the following:

- If the operator doesn't know the weight of the load to be lifted, he or she should use a dynamometer to measure it.
  - — First, the identification tag of the lifting device should be checked for its *Working Load Limit (WLL).*
  - — Then, the indicator on the dynamometer should be carefully watched.
  - — If the weight of the load approaches the WLL of the rigging, the load must be set down and a sling or other lifting device with a higher load limit must be used.
- The operator should never risk overloading the crane.

It might be useful to clarify the difference between rated capacity *and* Working Load Limit (WLL). *Both identify the maximum weight that should be lifted.* Rated capacity *refers to the crane itself, whereas* WLL *refers to the rigging.*

Explain the following specific information about the cranes in your facility:

- The rated capacity of each overhead crane
- Where to find the rated capacity on each crane
- Where to find dynamometers
- Specific instructions for operating dynamometers

Show Overhead #20, "Load Stability."

Explain the following:

- The operator also needs to make sure that the load is stable before lifting.

ASK: What are the potential hazards of not having a stable load?

Listen to responses.

Explain the following:

- The load may collapse or drop materials when lifted or moved.
- The load may collapse or tip when it's set down and the slings are removed.

Show Overhead #21, "Travel Concerns."

Explain the following:

- Before attaching the load, the operator should check out where it will be moved and placed.
  - — The path the load will travel must be clear.
  - — The area where the load will be placed must be prepared for it.

Show Overhead #22, "Attaching A Load."

Explain the following:

- When attaching a load, the operator should make sure the hoist rope or chain is free of kinks and twists and that it isn't wrapped around the load.
- The load can then be attached to the hook using slings or other lifting devices.

Show Overhead #23, "Attaching A Load (cont.)."

Explain the following:

- Once it's been attached, the load must be secured and properly balanced.
- The hook should be positioned above the center of gravity of the load to minimize swinging.
- The operator should make sure that there is no slack in and no jerking of the hoist rope/chain at the start of the lift.
- He or she should also make sure that no people or obstacles are in the path of the load.

Show Overhead #24, "Lifting And Moving A Load."

Explain the following:

- The operator should start to lift the load smoothly and slowly.
- He or she should apply power steadily to avoid jerking the load.
- A load should always be lifted vertically — never pulled from the side.
- Moreover, a load should be raised only high enough to clear any items in the path of travel — never higher.

ASK: Why should the load be raised only as high as necessary?

Listen to responses.

Explain the following:

- Doing so will reduce the likelihood of damage to materials on the ground, in the event that an equipment failure causes the load to fall.

Show Overhead #25, "Lifting And Moving A Load (cont.)."

Explain the following:

- A lifted load should *never* be left unattended.
- Also, a load must be unhooked after it's been lowered into position.
- A load that remains on the hook might tip if another crane bumps into the crane the load is attached to.

Explain that the operator must be aware of how much the crane will travel *after* the control button has been released — in other words, how far it will move after the operator has hit the button to stop it.

ASK: Why is this important?

Listen to responses.

Show Overhead #26, "Stopping A Load."

Explain the following:

- The amount of travel can vary greatly from crane to crane.
- The weight of the load and the amount of rope suspending the load must be considered in each case.
- The crane should always be operated slowly and smoothly.
- The operator should allow enough time and space to stop and bring the load safely into the desired position for lowering.

Show Overhead #27, "Lowering A Load."

Explain the following:

- Once the crane has come to a stop and the load has been stabilized, the operator should slowly lower the load.
- Once the load has reached the ground, the lifting devices should be removed.
- Finally, the hoist (including the hook attached to the hoist) should be lifted high enough off the ground so that no one will run into it.

Show Overhead #28, "Control Buttons."

Explain that the buttons on the control pendant usually include the following:

- On
- Off
- Up
- Down
- North
- South
- East
- West

ASK: Why is it important to know the *actual direction* the crane will move when each button is pushed?

Listen to responses.

Explain the following:

- The directions indicated on the control buttons may not necessarily correspond exactly to the compass directions in your facility.

Show Overhead #29, "Control Buttons (cont.)."

Explain the following:

- The operator must know the *actual direction* the crane will move when each button is pushed.
- Since each crane may be different, the operator should take the time to become familiar with each crane and its controls before lifting a load.

Show Overhead #30, "Two-Speed Cranes."

Explain the following:

- Some cranes have two-speed motors, which allows them to start out slowly and then pick up speed.
- In addition, some cranes have a button that will operate them at two speeds.
- Pushing the button slightly will allow for a slower speed, and pushing the button down all the way will allow for a faster speed.

Explain any specific information about safe crane operation in your facility.

Show Overhead #31, "Guidelines For Safe Crane Operation."

Explain that because of the potential danger in lifting and moving loads, crane operators must stay alert and focused on the crane's operation at all times. In addition, they should follow these guidelines for safe operation:

- Never move a crane until the following have been determined:
  - — No other cranes will come into contact with the crane being operated.
  - — No obstacles are in the path of the crane and/or load.
  - — No personnel are in the path of the load or will be under the load when it's raised.
  - — The area in which the load is to be placed is clear and prepared to receive the load.
  - — The crane and rigging have been inspected.

Show Overhead #32, "Guidelines For Safe Crane Operation (cont.)."

Explain the following:

- Never use the crane for side-pulling a load. A load must always be lifted and lowered vertically.
- Never exceed the crane's rated capacity.
- Inspect the crane before use or at the beginning of each shift.
- Use only certified and tested lifting devices.

Show Overhead #33, "Guidelines For Safe Crane Operation (cont.)."

Explain the following:

- Raise and secure the crane and its hoist/hook well above head level when leaving it unattended so as to prevent people from bumping their heads on it.
- Never leave a load suspended during a work break.
- Never operate a crane if a "DO NOT OPERATE" tag is attached to it.

Show Overhead #34, "Guidelines For Safe Crane Operation (cont.)."

Explain the following:

- Don't allow anyone to ride on a crane.
- Always leave the control pendant in a safe place when not using it. If it's left in a traffic aisle, it might be damaged by a forklift or other equipment.
- Know the specific location of the power disconnect for the crane, in the event that an emergency shutdown is required.

Explain any other guidelines for safe crane operation that apply to your facility.

"Overhead Crane Safety" Video, Part 4, Rigging

Explain that we will now watch Part 4 of the videotape. As they watch, ask participants to look for the following topics:

- Common types of rigging
- Rigging inspection
- Safety precautions when rigging a load

Show Part 4 of the videotape.

ASK: Does anyone have any questions?

Respond to questions.

Discussion Of Rigging

ASK: What is *rigging?*

Listen to responses.

Explain that *rigging* refers to how the load is attached to the hook of the crane.

Show Overhead #35, "Slings."

Explain the following:

- The most common type of rigging is a *sling*.
- A sling can be made of chain, nylon, wire rope or wire mesh.

ASK: What should every sling be rated for?

Listen to responses and expect the following:

- A sling must be rated to hold the weight of the load.

Show Overhead #36, "Slings (cont.)."

Explain the following:

- The *Working Load Limit (WLL)* of a sling can be found on the identification tag attached to it by the manufacturer.
- The WLL takes into consideration the normal wear of the sling and lifting hardware.

Show Overhead #37, "Chain Slings."

Explain the following:

- The standard chain sling configuration usually consists of two or more legs that are affixed on one end to a master link or ring with some type of attachment, usually a hook, affixed to the opposite end.

Show Overhead #38, "Nylon Slings."

Explain the following:

- A nylon sling consists of a length of nylon fabric with fittings or loops on both ends.
- A continuous nylon sling is a single sewn loop that can be configured in a variety of ways.

Show Overhead #39, "Wire Rope Slings."

Explain the following:

- A wire rope sling is sometimes used when lifting sharp or abrasive materials.

Show Overhead #40, "Wire Mesh Slings."

Explain the following:

- A wire mesh sling is made up of a length of wire mesh with openings for attachments at both ends.

ASK: What are engineered lifting devices?

Listen to responses.

Show Overhead #41, "Engineered Lifting Devices."

Explain the following:

- Engineered lifting devices are specialized types of equipment designed to simplify the rigging of equipment, parts and fixtures.

Show Overhead #42, "Engineered Lifting Devices (cont.)."

Explain the following:

- Typically, the lifting device is specifically designed to attach to a known part in a manufacturing operation, so using it can speed up the rigging process and improve rigging safety.
- An engineered lifting device must be designed by a competent individual who can certify that it will not fail under the anticipated load and working conditions.
- In addition, any such device must be prooftested with a weight that equals 125% of the WLL.
- Many manufacturers prooftest their devices to 2 times the WLL.

ASK: What are shop-made lifting devices?

Listen to responses.

Show Overhead #43, "Shop-Made Lifting Devices."

Explain the following:

- Shop-made lifting devices — made out of bolts, mild steel, scrap and the like — are often introduced into work facilities.
- Workers with good intentions may use these devices to solve immediate rigging needs.
- This is a very dangerous practice!

ASK: What are the potential hazards of shop-made lifting devices?

Listen to responses.

Show Overhead #44, "Shop-Made Lifting Devices (cont.)."

Explain the following:

- These devices often fail without notice, resulting in falling loads, damaged parts and equipment and potentially severe injuries.
- Whenever a shop-made device is discovered in the work area, it must be removed from service.
- Additionally, workers who are tempted to make or use these devices must be advised of the potential dangers of rigging with them.

Show samples of the types of slings used in your facility.

ASK: Why is it important to inspect all slings prior to using them?

Listen to responses.

Show Overhead #45, "Chain Sling Inspection."

Explain that chain slings must be inspected before use to check on the following:

- Before inspecting, clean chains with a nonacid/noncaustic solvent so as to make marks, nicks, wear and other defects clearly visible.
- Inspect chains for these problems:
  - — Twists or bends
  - — Nicks or gouges
  - — Excessive wear at bearing points
  - — Stretching
  - — Distorted or damaged master links, coupling links or attachments, especially spread in the throat openings of hooks

Show Overhead #46, "Chain Sling Inspection (cont.)."

Explain the following:

- Mark any damage plainly with a tag, and remove the chain from service until it's been properly repaired.

Show Overhead #47, "Nylon Sling Inspection."

Explain that before using nylon slings, they must be inspected for these problems:

- Holes, tears, cuts, burns, snags or embedded particles
- Any exposure of red warning yarn
  - — Red yarn is woven through the core of the sling material, and it is exposed when the sling becomes damaged or worn.
  - — If it's visible, the sling must be removed from service.

Show Overhead #48, "Nylon Sling Inspection (cont.)."

Explain that nylon slings must also be inspected for these problems:

- Broken or worn stitching in load-bearing splices
- Excessive wear or elongation exceeding the amount recommended by the manufacturer
- Knots in any part of the sling
- Distortion, excessive pitting, corrosion or broken fittings
- Other apparent defects that cause doubt as to the strength of the sling

Show Overhead #49, "Wire Rope Sling Inspection."

Explain that before using wire rope slings, they must be inspected for these problems:

- Broken wires, kinks or distortion of the rope
- Welding damage or burns
- Any other apparent defects that cause doubt as to the strength of the sling

Show Overhead #50, "Wire Mesh Sling Inspection."

Explain that before using wire mesh slings, they must be inspected for these problems:

- A broken weld or a broken brazed joint along the sling edge
- Wear as shown by nicks, cracks, breaks, gouges, stretch, bends or weld spatter on the chain or attachments
- A broken wire in any part of the mesh
- Reduction in wire diameter of 25% due to abrasion or 15% due to corrosion
- Lack of flexibility due to distortion of the mesh

Show Overhead #51, "Wire Mesh Sling Inspection (cont.)."

Explain that wire mesh slings must also be inspected for these problems:

- Visible distortion or cracks in the end fittings
- Chain links and attachments that don't hinge freely with adjacent links
- A 15% reduction of the original cross-sectional area of metal at any point around the hook opening or end fitting
- Discoloration from excessive temperature

Explain any specific inspection requirements for slings in your facility, including the following:

- Required daily, weekly, monthly and annual inspections
- Specific items that must be inspected
- Specific problems to look for
- Procedures for reporting damage

ASK: What other types of lifting devices were mentioned in the video?

Listen to responses.

Explain the following:

- Eyebolts
- Foundry hooks
- Hoist rings
- Lift magnets
- Lifting beams and spreader bars
- Plate clamps
- Shackles

Show Overhead #52, "Other Types Of Lifting Devices."

Explain that these types of lifting devices can be used to attach the load to the crane:

- *Eyebolts* attach directly to the load.
- *Foundry hooks* are used to attach a sling to a load.
- *Hoist rings* can be attached to a load to allow the attachment of hooks.
- *Lift magnets* can be used with loads made of low-carbon steel.

Show Overhead #53, "Other Types Of Lifting Devices (cont.)."

Explain that these lifting devices can also be used:

- *Lifting beams* and *spreader bars* provide safer rigging alternatives by reducing sling angles or by providing better rigging to attachment points on the load. Lifting beams can also be used to distribute the weight of a large load to multiple cranes.
- *Plate clamps* are clamped to the load and provide an attachment for the hook.
- *Shackles* are used to attach two or more slings to the hook.

ADD EXAMPLES

Explain the specific types of lifting devices used in your facility, including this information:

- What they are used for
- How to use them properly
- How to inspect them

ASK: According to the video, what is the major factor when rigging a load?

Listen to responses and expect the following:

- Safety is the major factor when rigging a load.

Show Overhead #54, "Determining Load Weight."

Explain the following:

- The first step is to determine the *weight of the load* and to use rigging that's rated for that weight.
- The *Working Load Limit (WLL)* can be found on the identification tag of a sling or other lifting device.

Explain that the next step is to determine the load's center of gravity.

ASK: What is a load's center of gravity?

Listen to responses and expect the following:

- This is the point on the load at which it will balance properly when lifted.

Show Overhead #55, "Center Of Gravity."

Explain the following:

- The center of gravity is not necessarily at the center of the load.
- When a load is lifted from any point other than the center of gravity, additional stress is placed on the sling and the crane, and the load might shift when being raised.

Show Overhead #56, "Determining The Center Of Gravity."

Explain that if the center of gravity is unknown, the operator should do these things:

- Make a good estimate.
- Based on that estimate, attach the appropriate lifting device.
- Next, *slowly* lift the load.
- If the load starts to swing in any direction, it isn't in balance.
- If that's the case, it should be lowered and the slings should be adjusted to center the load accurately on the crane.

ASK: What does the term *sling angle* refer to?

Listen to responses.

Explain the following:

- The *sling angle* refers to how much the sling varies to horizontal.

Show Overhead #57, "Sling Angles."

Explain the following:

- If the sling is straight up and down, it is 90° to horizontal.
- The lower the sling angle, the higher the tension in the sling.

Show Overhead #58, "Sling Angles (cont.)."

Explain the following:

- A good operating practice is to keep the sling angle above 45°.
- Sling angles of 60° to 90° are preferred.

Explain that safety precautions must be taken when using any lifting device.

Show Overhead #59, "Sling Safety Precautions."

Explain the following:

- Use a sling rated for the expected load.
- In some rigging situations, the load may place increased stress on the rigging.
- If that's the case, slings and rigging devices rated for higher capacities should be used.

Show Overhead #60, "Sling Safety Precautions (cont.)."

Explain the following:

- Use a sling that lifts the load high enough to clear obstructions on the ground.
- Make sure the sling hooks have safety latches installed.
- When using a nylon sling, make sure it grips the load; put the sling around the load so it won't slip.
- When using a wire mesh sling, don't let the sling twist or bend.

Show Overhead #61, "Safety Precautions For Eyebolts."

Explain the following:

- Never used bent, damaged, worn or rusted eyebolts.
- Make sure the angle of the pull on an eyebolt is vertical so as to avoid bending or breaking it.
- Make sure the eyebolt is completely seated into the part.

Show Overhead #62, "Safety Precautions For Lift Magnets."

Explain the following:

- Make sure the working face of the magnet is in good condition.
- Make sure the lifting face and the load are free of any debris (such as metal chips, scrap, etc.) and excessive oil.
- Make sure the lift magnet is properly seated on the load.

Show Overhead #63, "Safety Precautions For Lifting Beams."

Explain the following:

- Use a lifting beam with a rated capacity that's adequate for the load.
- Make sure the load is rigged as evenly as possible by placing the hooks in the correct locations on the beam.

Show Overhead #64, "Safety Precautions For Plate Clamps."

Explain the following:

- Make sure the load can be inserted all the way into the throat opening of the clamp.
- Never attach a plate clamp to an oily surface.

Show Overhead #65, "Safety Precautions For Plate Clamps (cont.)."

Explain the following:

- Never lift more than one sheet of material at a time; doing so can cause material to be dropped from the clamp.
- Use as many clamps as necessary to balance the load.
- Don't bump the load during lifting or moving, as it could cause the clamps to release.
- Never remove a clamp until the load is at rest and fully supported.

Explain any other safety precautions for the specific types of lifting devices used in your facility.

"Overhead Crane Safety" Video, Part 5, Review

Explain that we will now watch Part 5 of the videotape. As they watch, ask participants to look for the following topics:

- Responsibilities of the operator

Show Part 5 of the videotape.

ASK: Does anyone have any questions?

Respond to questions.

Review Of Operator Responsibilities

Show Overhead #66, "Operator Responsibilities."

Explain the following:

- The operator is responsible for the safe operation of the crane.
- This means the operator must be aware of the potential hazards both to people and equipment that may result from crane operation.
- The crane must be operated in the safest manner possible at all times.
- The operator must be alert and aware of the crane, the rigging, the load and the surrounding area.

Show Overhead #67, "Before Operating The Crane."

Explain the following:

- Inspect the crane and all rigging before moving a load.
- Determine the weight and center of gravity of the load.
- Make sure the load is stable.
- Make sure the pathway is clear of other cranes, personnel, equipment and other obstacles.

Show Overhead #68, "When Operating The Crane."

Explain the following:

- Always operate the crane slowly and smoothly.
- Never exceed the rated capacity of the crane.
- Always lift and lower loads vertically; never side-pull loads.
- Never move loads over the heads of personnel.
- Never leave a raised load unattended.

Learning Exercise

Hand out the Learning Exercise (found at the end of this Instructor Guide).

Explain that this is an exercise, not a test.

Explain that it should take about 10 minutes to complete.

Provide answers to the Learning Exercise after all participants have completed it. Have participants self-grade their exercises and turn them in. Keep the exercises in a file for future reference.

Participants who answered less than 80% of the questions correctly may not have comprehended the training. Additional one-on-one training may be necessary.

Answers To Learning Exercise

1. All cranes are exactly the same and are operated in exactly the same manner.
   False. *There are many different types of overhead cranes, depending on how the crane lifts and moves a load, and each may have different operating characteristics.*

2. The operator must be alert and aware of the crane, the rigging, the load and the surrounding area.
   True.

3. An overhead crane must be inspected before use or at the beginning of each shift.
   True.

4. It's OK to use rigging that's rated for slightly less than the weight of the load.
   False. *Rigging should be used that's rated for* more *than the weight of the load. In some rigging situations, the load may place increased stress on the rigging. When this is the case, slings and rigging devices rated for higher Work Load Limits must be used.*

5. Side-loading a crane is a safe way to move a heavy load.
   False. *The load should always be lifted vertically — never pulled from the side.*

6. A crane will often travel some distance after the control button has been released.
   True.

7. Once the crane has come to a stop and the load has been stabilized, the operator can slowly lower the load.
   True.

8. Pressing the control button labeled "North" will always make the crane move toward the earth's magnetic North Pole.
   False. *The directions indicated on the control buttons may not necessarily correspond to actual directions within the facility, depending on the crane's location and orientation to the compass.*

9. The operator should never leave a lifted load unattended.
   True.

10. A load can be lifted over people as long as it's high enough to clear them.
    False. *A load should never be moved over people.*

11. What should you determine before moving a crane?
    - *No other cranes will come into contact with the crane being operated.*
    - *No obstacles are in the path of the crane and/or load.*
    - *No personnel are in the path of the load or will be under the load when it's raised.*
    - *The area where the load is to be placed is clear and prepared to receive it.*
    - *The crane and rigging have been inspected.*

12. What are three types of rigging used in your facility?
    Check answers against the types of rigging used in your facility. Answers may include any three of the following:
    - *Slings (chain, nylon, wire mesh)*
    - *Eyebolts*
    - *Foundry hooks*
    - *Hoist rings*
    - *Lift magnets*
    - *Lifting beams*
    - *Plate clamps*
    - *Shackles*

13. What are three things you should inspect before using a crane?
    Check answers against the types of cranes used in your facility. Answers may include any three of the following:
    - *The controls and operating mechanisms are in proper working order.*
    - *The hoist upper-limit switch/device is operating properly.*
    - *If so equipped, all lines, valves and other parts of air systems are properly sealed and free of leakage.*
    - *Hooks contain no cracks, deformation or other damage.*
    - *Hoist ropes are free from kinking, crushing, bird caging, corrosion and other damage, and wire hoist ropes have no broken wires.*
    - *The hoist chain has no nicks, gouges, distortion, wear, corrosion or other damage.*

14. What are three things you should inspect before using a sling?
    Check answers against the types of rigging used in your facility. Answers may include any three of the following:
    - ***Chain Slings***
      - *Before inspecting, clean chains with a nonacid/noncaustic solvent so as to make marks, nicks, wear and other defects clearly visible.*
      - *Inspect chains for these problems:*
        - *Twists or bends*
        - *Nicks or gouges*
        - *Excessive wear at bearing points*
        - *Stretching*
        - *Distorted or damaged master links, coupling links or attachments, especially spread in the throat openings of hooks*
      - *Mark any damage plainly with a tag, and remove the chain from service until it's been properly repaired.*

- ***Nylon Slings***
  - — *Holes, tears, cuts, burns, snags or embedded particles*
  - — *Any exposure of red warning yarn (Red yarn is woven through the core of the sling material, and it is exposed when the sling becomes damaged or worn. If it's visible, the sling must be removed from service.)*
  - — *Broken or worn stitching in load-bearing splices*
  - — *Excessive wear or elongation exceeding the amount recommended by the manufacturer*
  - — *Knots in any part of the sling*
  - — *Distortion, excessive pitting, corrosion or broken fittings*
  - — *Other apparent defects that cause doubt as to the strength of the sling*
- ***Wire Rope Slings***
  - — *Broken wires, kinks or distortion of the rope*
  - — *Welding damage or burns*
  - — *Any other apparent defects that cause doubt as to the strength of the sling*
- ***Wire Mesh Slings***
  - — *A broken weld or a broken brazed joint along the sling edge*
  - — *Wear as shown by nicks, cracks, breaks, gouges, stretch, bends or weld spatter on chain or attachments*
  - — *A broken wire in any part of the mesh*
  - — *Reduction in wire diameter of 25% due to abrasion or 15% due to corrosion*
  - — *Lack of flexibility due to distortion of the mesh*
  - — *Visible distortion or cracks in the end fittings*
  - — *Chain links and attachments that don't hinge freely with adjacent links*
  - — *A 15% reduction of the original cross-sectional area of metal at any point around the hook opening or end fitting*
  - — *Discoloration from excessive temperature*

15. What steps should you follow for determining a load's center of gravity?
    - *If the center of gravity is unknown, you should make a good estimate.*
    - *Based on that estimate, attach the appropriate lifting device.*
    - *Slowly lift the load.*
    - *If the load starts to swing in any direction, it isn't in balance.*
    - *If that's the case, lower the load and adjust the slings to center the load accurately on the crane.*

Close

Discuss any issues about overhead crane safety in your workplace.

Discuss any follow-up activities you have planned.

Thank participants for their attention, and remind them that it's their responsibility to do the following:

- Know how to operate overhead cranes safely
- Know how to inspect cranes and rigging
- Know how to rig loads safely

End the session.

Following the session, make sure that the Overhead Crane Safety Training Record is brought up to date, noting participants' names, job titles, training type, training date and instructor's name.

Delivery: Field Session

This session is best conducted on an individual or small-group basis. Use the Overhead Crane Operator Evaluation Checklist, found at the end of this guide, to check each *participant's skill level as you conduct the Field Session.*

Each participant should repeat each activity until you are satisfied that he or she understands it and can perform it safely.

Also see the suggestions for conducting this session on pages 44–45.

Demonstrate the proper inspection of the cranes in your facility.

Instruct participants to practice the inspection procedures.

Demonstrate the proper operation of the cranes in your facility.

Instruct the participant to practice identifying and operating the controls for each crane.

Ensure that each participant understands these topics:

- The specific control buttons for each crane
- The directional control buttons for each crane
- Potential hazards in the area of each crane:
  - — Other cranes
  - — Structural obstacles
  - — Equipment and other obstacles
  - — Areas where personnel may be working
  - — The specific location of the power disconnect to be used in the event of an emergency shutdown of the crane

Demonstrate how to locate the rated capacity of each crane and how to determine the weight of each load.

Ensure that each participant knows the following:

- Where to find the rated capacity on each crane
- Where to find dynamometers in your facility
- Specific instructions for operating dynamometers in your facility

Demonstrate the proper procedures for rigging a load and using the rigging equipment found in your workplace, including the following:

- Selecting the proper rigging for different loads
- Inspecting rigging equipment
- Determining the weight of the load
- Finding the center of gravity
- Testing the rigging before lifting

Instruct the participant to practice rigging loads.

Demonstrate the proper procedures for moving a load, including the following:

- Moving the crane into place
- Attaching the load to the crane
- Lifting the load
- Moving the load
- Lowering the load
- Disconnecting the load from the crane

End the session.

Following the session, make sure that the Overhead Crane Safety Training Record is brought up to date, noting participants' names, job titles, training type, training date and instructor's name.

Suggestions For Conducting A Successful Field Session

When conducting a Field Session, your goal is to make sure participants can safely do these things:

- Operate the cranes required for their jobs
- Select and use all rigging equipment required for their jobs
- Rig, lift, move and lower loads

The more realistic the practice scenarios you provide, the better participants will be able to practice and learn what they need to know to do their jobs safely.

Keep the following in mind when creating practice scenarios:

- Have sample loads available to simulate the loads participants will be required to work with in their jobs.
- Use or set up areas that are similar to actual areas in the workplace where participants will be required to rig or set down loads, including these:
  - Pallets
  - Frames
  - Platforms
- *For Practice In Inspecting*
  - Have samples of cranes and rigging equipment with typical damage.
  - These can be collected during the normal course of operations and made available for training.
- *For Practice In Stopping*
  - Set up two cones to identify the area where the load will be stopped and lowered.
  - Mark off the area with tape on the floor.
  - Leave ample room beyond the designated area to allow for making mistakes without causing damage.
- *For Practice In Rigging*
  - Have available all types of rigging that participants will use in their jobs, including options (where appropriate).
  - Make different types of loads available.
  - Set up a scenario in which participants can practice setting up proper sling angles.
- *For Practice In Determining Center Of Gravity*
  - Provide a sample load that has a center of gravity that is off center or that can be adjusted to move the center of gravity.
  - Then have participants practice the proper procedures for determining the center of gravity before lifting and moving a load.

Creating And Using Training Devices

Operators who are participating in the Field Session of the Overhead Crane Safety course will need to have samples of equipment, materials and loads that are typical of what they will move during their work activities.

Depending on the types of materials that are moved — and the potential costs of damage to those materials — it may not be possible to conduct a Field Session using actual products, equipment and materials. For example, it may be difficult to have an operator practice a move such as turning over a part if doing so will increase the chance for damaging the crane or rigging should the part be allowed to "shock load" the equipment. Other operations or rigging situations may require the use of specialized rigging equipment that isn't used very often; even so, operators should still know how to use it safely.

If these situations exist in your workplace, you may need to create a training device that simulates the types of materials that will be moved with overhead cranes. A *training device* is a designated tool that simulates the types of lifts, rigging or operations that will be part of the operator's daily activities.

The training device doesn't need to be elaborate; it can be built of lumber or metal. It should be substantially lighter than the Working Load Limits of the slings and other rigging devices, as well as the crane, to allow for learning errors by class participants. It's much easier to learn with a weight that's 10% to 20% of the Working Load Limit than with actual load limits.

The training device should also be equipped with multiple attachment points to give the participant practice in balancing loads and simulating odd-shaped parts. If a variety of rigging devices are available in your facility — such as plate clamps, magnets and spreader bars — they can all be incorporated into the training device as alternative attachments.

If you build a training device, it's strongly encouraged that you have a competent engineer review the design of the device to make sure that it won't fail during use. It's also recommended that you prooftest all attachment points to 125% of the Working Load Limit before putting the training device in service.

Training Tips

Conducting A Successful Training Session

When conducting a training session, your goal is to communicate the information and have participants understand and apply the information to their jobs. In order to help you reach this goal, here are some suggestions for conducting a successful training session:

- Recognize and allow for differences in participants, backgrounds, needs and learning abilities.
- Make sure participants understand the training objectives.
- Allow participants to take an active role in their learning.
- Use guiding comments such as "That's a good point," "What do the rest of you think?" "Can you tell me more?" and "Who has a different point of view?" to provide opportunities for interaction and to avoid lecturing.
- Relate the information in the training session to real-life experiences. Use examples from your workplace to help participants connect the information to their activities.
- Proceed from simple concepts to more complex.
- Review and summarize at the end of the session using the session objectives.
- Set a time schedule, and monitor it throughout the session. Discussions and practice may make the session longer, depending on the number of participants.
- If you are asked a question that you can't answer, don't be afraid to say "I don't know, but I will find out the answer for you."

Using Questions

One of the most effective training tools you can use is a question. You can use questions to do these things:

- Kick off a discussion.
- Start the group thinking about a topic.
- Determine participants' knowledge of a topic.
- Collect data from participants.
- Get all participants involved.
- Change the direction of the discussion.
- Identify conclusions and summarize a discussion.

The following types of questions can be used to direct and stimulate group discussions:

- *Overhead:* This type of question is usually used after any introductory remarks and is directed to the entire group. Its purpose is to provoke discussion and elicit responses from as many members as possible.
- *Direct:* This type of question is the opposite of the overhead question. It's aimed at a specific individual, such as someone who appears timid or inattentive, to draw him or her into the discussion. This type of question can also be used to bring a rambling discussion back to the point or to draw out special information from a particular group member.
- *Reverse:* This type of question allows you to avoid giving a personal opinion in response to a group member's question. For example, if a participant asks you a question to which you don't want to give your personal opinion, you may turn the question around by asking a question like one of these:
  — "What does that term mean to you?"
  — "How does that make you feel?"
  — "What would you do?"
  Reverse questions elicit background and promote group discussion.
- *Follow-Up:* This type of question is designed to expand the discussion or lead the group forward toward the session's objectives.

Handling A Difficult Group

Occasionally, you'll get a group that's difficult to handle. Here are a few ideas on how to work with this type of group and help them understand and apply the information:

- If your group is quiet or unresponsive, allow time for participants to "warm up." In this case, ask nonthreatening questions that are easy to answer.
- If your group won't stop discussing, commend participants for their high level of participation and then tell them that it's time to move on.
- If you have a group of "fighters," encourage those participants who strongly disagree on an issue to think of ways to resolve the disagreement.

Handling Difficult Participants

To keep the session productive and on target, here are a few methods for dealing with some types of difficult participants:

- An overly helpful participant who jumps in with a response to every question may prevent others from becoming involved. Make a special effort to engage other participants in the exercise or discussion.
- A participant who won't be budged from his or her opinion can be asked to accept the group consensus for the moment and then assured that you will be glad to discuss his or her point of view later.
- A participant who points out the worst in every idea but seldom offers an alternative can be acknowledged politely but passed over for other opinions.
- An overly talkative participant can be put back on track by restating the relevant points or by pointing out (with a smile) that the person is a bit "off the subject."
- A reserved participant can be drawn out by asking a direct question and then following the response with a sincere compliment.
- A daydreamer in the group can be brought back to attention by asking an easy question or restating earlier remarks and asking for his or her opinion.

Learning Exercise

Directions: Answer each of the following questions "True" or "False" by circling the appropriate letter.

T F 1. All cranes are exactly the same and are operated in exactly the same manner.

T F 2. The operator must be alert and aware of the crane, the rigging, the load and the surrounding area.

T F 3. An overhead crane must be inspected before use or at the beginning of each shift.

T F 4. It's OK to use rigging that's rated for slightly less than the weight of the load.

T F 5. Side-loading a crane is a safe way to move a heavy load.

T F 6. A crane will often travel some distance after the control button has been released.

T F 7. Once the crane has come to a stop and the load has been stabilized, the operator can slowly lower the load.

T F 8. Pressing the control button labeled "North" will always make the crane move toward the earth's magnetic North Pole.

T F 9. The operator should never leave a lifted load unattended.

T F 10. A load can be lifted over people as long as it's high enough to clear them.

Complete each of the following questions:

11. What should you determine before moving a crane?

_____

_____

_____

_____

_____

_____

12. What are three types of rigging used in your facility?

13. What are three things you should inspect before using a crane?

14. What are three things you should inspect before using a sling?

15. What steps should you follow for determining a load's center of gravity?

Name: _____ Date: _____

Employee Identification #: _____

Company: _____

Trainer's Name: _____

Answers To Learning Exercise

1. **False.** There are many different types of overhead cranes, depending on how the crane lifts and moves a load, and each may have different operating characteristics.
2. **True.**
3. **True.**
4. **False.** Rigging should be used that's rated for *more* than the weight of the load. In some rigging situations, the load may place increased stress on the rigging. When this is the case, slings and rigging devices rated for higher Work Load Limits must be used.
5. **False.** The load should always be lifted vertically — never pulled from the side.
6. **True.**
7. **True.**
8. **False.** The directions indicated on the control buttons may not necessarily correspond to actual directions within the facility, depending on the crane's location and orientation to the compass.
9. **True.**
10. **False.** A load should never be moved over people.
11. • No other cranes will come into contact with the crane being operated.
    • No obstacles are in the path of the crane and/or load.
    • No personnel are in the path of the load or will be under the load when it's raised.
    • The area where the load is to be placed is clear and prepared to receive it.
    • The crane and rigging has been inspected.
12. Check answers against the types of rigging used in your facility. Answers may include any three of the following:
    • Slings (chain, nylon, wire mesh)
    • Eyebolts
    • Foundry hooks
    • Hoist rings
    • Lift magnets
    • Lifting beams
    • Plate clamps
    • Shackles

13. Check answers against the types of cranes used in your facility. Answers may include any three of the following:
    - The controls and operating mechanisms are in proper working order.
    - The hoist upper-limit switch/device is operating properly.
    - If so equipped, all lines, valves and other parts of air systems are properly sealed and free of leakage.
    - Hooks contain no cracks, deformation or other damage.
    - Hoist ropes are free from kinking, crushing, bird caging, corrosion and other damage, and wire hoist ropes have no broken wires.
    - The hoist chain has no nicks, gouges, distortion, wear, corrosion or other damage.

14. Check answers against the types of rigging used in your facility. Answers may include any three of the following:
    - *Chain Slings*
        - — Before inspecting, clean chains with a nonacid/noncaustic solvent so as to make marks, nicks, wear and other defects clearly visible.
        - — Inspect chains for these problems:
            - — Twists or bends
            - — Nicks or gouges
            - — Excessive wear at bearing points
            - — Stretching
            - — Distorted or damaged master links, coupling links or attachments, especially spread in the throat openings of hooks
        - — Mark any damage plainly with a tag, and remove the chain from service until it's been properly repaired.
    - *Nylon Slings*
        - — Holes, tears, cuts, burns, snags or embedded particles
        - — Any exposure of red warning yarn (Red yarn is woven through the core of the sling material, and it is exposed when the sling becomes damaged or worn. If it's visible, the sling must be removed from service.)
        - — Broken or worn stitching in load-bearing splices
        - — Excessive wear or elongation exceeding the amount recommended by the manufacturer
        - — Knots in any part of the sling
        - — Distortion, excessive pitting, corrosion or broken fittings
        - — Other apparent defects that cause doubt as to the strength of the sling
    - *Wire Rope Slings*
        - — Broken wires, kinks or distortion of the rope
        - — Welding damage or burns
        - — Any other apparent defects that cause doubt as to the strength of the sling

- *Wire Mesh Slings*
  - — A broken weld or a broken brazed joint along the sling edge
  - — Wear as shown by nicks, cracks, breaks, gouges, stretch, bends or weld spatter on chain or attachments
  - — A broken wire in any part of the mesh
  - — Reduction in wire diameter of 25% due to abrasion or 15% due to corrosion
  - — Lack of flexibility due to distortion of the mesh
  - — Visible distortion or cracks in the end fittings
  - — Chain links and attachments that don't hinge freely with adjacent links
  - — A 15% reduction of the original cross-sectional area of metal at any point around the hook opening or end fitting
  - — Discoloration from excessive temperature

15. • If the center of gravity is unknown, you should make a good estimate.
    - Based on that estimate, attach the appropriate lifting device.
    - *Slowly* lift the load.
    - If the load starts to swing in any direction, it isn't in balance.
    - If that's the case, lower the load and adjust the slings to center the load accurately on the crane.

Overhead Crane Training Record Form

Facility	Department	Date

Employee Name & Identification Number (please print)	**Job Title** (please print)	**Employee Signature**
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		
Name:		
ID:		

Signature Of Trainer

Overhead Crane Operator Evaluation Form

Instructions: *Use this checklist during the field session to evaluate operator proficiency. It can also be used for periodic evaluation to ensure that operators are continuing to operate overhead cranes properly.*

Operator Name	**Evaluator Name**
Date Of Evaluation	**Equipment Operated**

Operator Behaviors	Good	Fair	Poor	N/A	Comments
Crane and Rigging Inspection					
1. Controls	☐	☐	☐	☐	
2. Operating Mechanisms	☐	☐	☐	☐	
3. Hoist upper limit switch	☐	☐	☐	☐	
4. Air systems (if so equipped)	☐	☐	☐	☐	
5. Hooks	☐	☐	☐	☐	
6. Hoist ropes/chains	☐	☐	☐	☐	
7. Slings	☐	☐	☐	☐	
8. Other lifting devices	☐	☐	☐	☐	
Crane Movement Without Load					
1. Operator alert and focused on crane operation at all times	☐	☐	☐	☐	
2. Operator looks for other cranes in the area	☐	☐	☐	☐	
3. Looks for obstacles the path of the crane	☐	☐	☐	☐	
4. Demonstrates correct operation of controls	☐	☐	☐	☐	
5. Starts and stops crane smoothly	☐	☐	☐	☐	
Rigging					
1. Verifies load weight and crane rated capacity	☐	☐	☐	☐	
2. Uses dynamometer to weigh load if load weight is unknown	☐	☐	☐	☐	
3. Hoist rope is free from kinks/twists and is not wrapped around load	☐	☐	☐	☐	
4. Selects proper rigging for load	☐	☐	☐	☐	
5. Properly secures rigging to load	☐	☐	☐	☐	
6. Properly checks for center of gravity and balances load	☐	☐	☐	☐	
7. Takes up slack in hoist rope	☐	☐	☐	☐	
Lifting and Moving a Load					
1. Checks path for obstacles/personnel	☐	☐	☐	☐	
2. Slow, smooth vertical lift of load	☐	☐	☐	☐	
3. Load raised high enough to clear obstacles	☐	☐	☐	☐	
4. Avoids contacting obstacles while moving load	☐	☐	☐	☐	
5. Demonstrates correct operation of controls	☐	☐	☐	☐	

Operator Behaviors	Good	Fair	Poor	N/A	Comments
Stopping a Load					
1. Releases button to allow for crane/load travel	☐	☐	☐	☐	
2. Slow, smooth stopping of load in desired position for lowering	☐	☐	☐	☐	
Lowering a Load					
1. Crane stopped and load stable before lowering	☐	☐	☐	☐	
2. Slow, smooth lowering of load in desired position	☐	☐	☐	☐	
3. Lifting devices removed and returned to the	☐	☐	☐	☐	
4. Hoist lifted high enough to avoid personnel contact	☐	☐	☐	☐	
5. Control pendent cleared of traffic aisle	☐	☐	☐	☐	

Comments:

☐ Based on my evaluation, the operator **has successfully** completed the evaluation and is qualified to operate the following equipment:

☐ Based on my evaluation, the operator **has not demonstrated** competence in operating the following equipment:

Equipment Type
Equipment Type

Evaluator Signature

Operator Signature

Overhead Crane Safety

Self-Study Mentor Guide

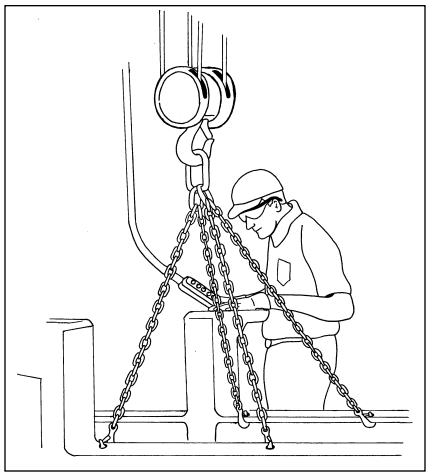
Table Of Contents

The information contained in this program has been developed in good faith and is believed to present good safety principles. CLMI and all other participating organizations make no representations or warranties as to the completeness or accuracy thereof. Persons using this information must make their own determination as to its suitability for their purposes in support of their own safety programs. CLMI and all other participating organizations are in no way responsible for damages of any nature resulting from the use of this information.

Funding for development of this program has been provided by the Minnesota Job Skills Partnership through the collaborative efforts of Caterpillar Paving Products, Inc., and The Center for Training and Development.

The Center for Training and Development

The Mentor's Role



The Overhead Crane Safety Self-Study training materials have been designed to provide crane operators with the information they need to use cranes safely in the workplace. However, to ensure that they can apply what they have learned in training to actual crane operation, the mentor's role is an important one.

As the mentor, you will act as trainer, coach and evaluator for each participant in the self-study program. Specifically, your duties will include the following:

- Meet with each participant after he or she has completed the Self-Study Workbook to do these things:
  - — Check the Answer Sheet.
  - — Discuss what the participant has learned.
  - — Correct any mistakes or misunderstandings.
  - — Ensure that he or she understands the materials.
- Conduct a Field Session to do the following:
  - — Demonstrate the proper procedures for inspecting and operating cranes and rigging.
  - — Allow the participant to practice what he or she has learned.
  - — Evaluate the participant's ability to operate cranes safely in your workplace.

Meet With The Participant

The self-study program is a 1- to 2-hour session for individual participants, and it uses a workbook and a videotape on the safe operation of overhead cranes. The participant will watch the videotape, and then or she will write answers to the workbook questions. The participant should write his or her answers on the Answer Sheet provided in the Self-Study Workbook.

When you meet with the participant, review his or her Answer Sheet. (The correct answers can be found in the Answer Key at the end of this guide.) If you are satisfied that the participant understands the materials, you can schedule and conduct the Field Session. If you have doubts or concerns about the participant's understanding at this point, instruct him or her to review the workbook and videotape, and then have him or her complete another Answer Sheet for your review.

You should not proceed with the Field Session until the participant has sufficiently mastered the video and workbook materials.

Conduct The Field Session

In the Field Session, you will demonstrate and provide the opportunity for participants to practice using the cranes and rigging equipment they will use in their jobs. In addition, you will evaluate participants' performance to ensure that they can safely operate cranes in your workplace.

This session is best conducted on an individual or small-group basis. Use the Overhead Crane Operator Evaluation Checklist, found at the end of this guide, to check each participant's skill level as you conduct the Field Session.

Each participant should repeat each activity until you are satisfied that he or she understands it and can perform it safely.

Also see the suggestions for conducting this session on page M-4.

The following should be part of your Field Session:

- Demonstrate the proper inspection of the cranes in your facility, and have participants practice the inspection procedures.
- Demonstrate the operation of the cranes in your facility, and have participants practice identifying and operating the controls for each crane. Make sure that participants understand these concepts:
  - The specific control buttons for each crane
  - The directional control buttons for each crane and how the crane moves when each button is pushed
  - Potential hazards in the area of each crane:
    - Other cranes
    - Structural obstacles
    - Equipment and other obstacles
    - Areas where personnel may be working
    - The specific location of the power disconnect to be used in the event of an emergency shutdown of the crane
- Demonstrate how to locate the rated capacity of each crane and how to determine the weight of each load. Make sure participants know this information:
  - Where to find the rated capacity on each crane
  - Where to find dynamometers in your facility
  - Specific instructions for operating dynamometers in your facility
- Demonstrate the proper procedures for rigging a load using the rigging equipment in your workplace, and then have participants practice rigging loads. Include the following steps:
  - Selecting the proper rigging for different loads
  - Inspecting rigging equipment
  - Determining the weight of the load
  - Finding the center of gravity
  - Testing the rigging before lifting
- Demonstrate the proper procedures for moving a load, including the following:
  - Moving the crane into place
  - Attaching the load to the crane
  - Lifting the load
  - Moving the load
  - Lowering the load
  - Disconnecting the load from the crane

How To Conduct A Successful Field Session

When conducting a Field Session, your goal is to make sure participants can safely do these things:

- Operate the cranes required for their jobs
- Select and use all rigging equipment required for their jobs
- Rig, lift, move and lower loads

The more realistic the practice scenarios you provide, the better participants will be able to practice and learn what they need to know to do their jobs safely.

Keep the following in mind when creating practice scenarios:

- Have sample loads available to simulate the loads participants will be required to work with in their jobs.
- Use or set up areas that are similar to actual areas in the workplace where participants will be required to rig or set down loads, including these:
  - — Pallets
  - — Frames
  - — Platforms
- *For Practice In Inspecting*
  - — Have samples of cranes and rigging equipment with typical damage.
  - — These can be collected during the normal course of operations and made available for training.
- *For Practice In Stopping*
  - — Set up two cones to identify the area where the load will be stopped and lowered.
  - — Mark off the area with tape on the floor.
  - — Leave ample room beyond the designated area to allow for making mistakes without causing damage.
- *For Practice In Rigging*
  - — Have available all types of rigging that participants will use in their jobs, including options (where appropriate).
  - — Make different types of loads available.
  - — Set up a scenario in which participants can practice setting up proper sling angles.
- *For Practice In Determining Center Of Gravity*
  - — Provide a sample load that has a center of gravity that is off center or that can be adjusted to move the center of gravity.
  - — Then have participants practice the proper procedures for determining the center of gravity before lifting and moving a load.

How To Create And Use Training Devices

Operators who are participating in the Field Session of the Overhead Crane Safety course will need to have samples of equipment, materials and loads that are typical of what they will move during their work activities.

Depending on the types of materials that are moved — and the potential costs of damage to those materials — it may not be possible to conduct a Field Session using actual products, equipment and materials. For example, it may be difficult to have an operator practice a move such as turning over a part if doing so will increase the chance for damaging the crane or rigging should the part be allowed to "shock load" the equipment. Other operations or rigging situations may require the use of specialized rigging equipment that isn't used very often; even so, operators should still know how to use it safely.

If these situations exist in your workplace, you may need to create a training device that simulates the types of materials that will be moved with overhead cranes. A *training device* is a designated tool that simulates the types of lifts, rigging or operations that will be part of the operator's daily activities.

The training device doesn't need to be elaborate; it can be built of lumber or metal. It should be substantially lighter than the Working Load Limits of the slings and other rigging devices, as well as the crane, to allow for learning errors by class participants. It's much easier to learn with a weight that's 10% to 20% of the Working Load Limit than with actual load limits.

The training device should also be equipped with multiple attachment points to give the participant practice in balancing loads and simulating odd-shaped parts. If a variety of rigging devices are available in your facility — such as plate clamps, magnets and spreader bars — they can all be incorporated into the training device as alternative attachments.

If you build a training device, it's strongly encouraged that you have a competent engineer review the design of the device to make sure that it won't fail during use. It's also recommended that you prooftest all attachment points to 125% of the Working Load Limit before putting the training device in service.

Answer Key

Directions: Use this key to score the participant's answers to the questions in the Self-Study Workbook.

Part 1: Overhead Crane Overview

1. b
2. a
3. c
4. d

Part 2: Overhead Crane Inspection

5. d
6. a
7. b
8. d
9. b

Part 3: Overhead Crane Operation

10. d
11. e
12. b
13. d
14. b
15. d
16. c
17. c
18. d
19. a
20. d
21. b
22. c
23. a

Part 4: Rigging

24. c
25. a
26. c
27. d
28. c
29. e
30. a
31. b
32. a
33. d
34. c
35. d
36. b
37. c
38. f
39. e

Part 5: Review

40. b
41. c
42. f
43. d
44. a
45. c

Overhead Crane Operator Evaluation Form

Instructions: *Use this checklist during the field session to evaluate operator proficiency. It can also be used for periodic evaluation to ensure that operators are continuing to operate overhead cranes properly.*

Operator Name	**Evaluator Name**
Date Of Evaluation	**Equipment Operated**

Operator Behaviors	Good	Fair	Poor	N/A	Comments
Crane and Rigging Inspection					
1. Controls	☐	☐	☐	☐	
2. Operating Mechanisms	☐	☐	☐	☐	
3. Hoist upper limit switch	☐	☐	☐	☐	
4. Air systems (if so equipped)	☐	☐	☐	☐	
5. Hooks	☐	☐	☐	☐	
6. Hoist ropes/chains	☐	☐	☐	☐	
7. Slings	☐	☐	☐	☐	
8. Other lifting devices	☐	☐	☐	☐	
Crane Movement Without Load					
1. Operator alert and focused on crane operation at all times	☐	☐	☐	☐	
2. Operator looks for other cranes in the area	☐	☐	☐	☐	
3. Looks for obstacles the path of the crane	☐	☐	☐	☐	
4. Demonstrates correct operation of controls	☐	☐	☐	☐	
5. Starts and stops crane smoothly	☐	☐	☐	☐	
Rigging					
1. Verifies load weight and crane rated capacity	☐	☐	☐	☐	
2. Uses dynamometer to weigh load if load weight is unknown	☐	☐	☐	☐	
3. Hoist rope is free from kinks/twists and is not wrapped around load	☐	☐	☐	☐	
4. Selects proper rigging for load	☐	☐	☐	☐	
5. Properly secures rigging to load	☐	☐	☐	☐	
6. Properly checks for center of gravity and balances load	☐	☐	☐	☐	
7. Takes up slack in hoist rope	☐	☐	☐	☐	
Lifting and Moving a Load					
1. Checks path for obstacles/personnel	☐	☐	☐	☐	
2. Slow, smooth vertical lift of load	☐	☐	☐	☐	
3. Load raised high enough to clear obstacles	☐	☐	☐	☐	
4. Avoids contacting obstacles while moving load	☐	☐	☐	☐	
5. Demonstrates correct operation of controls	☐	☐	☐	☐	

Operator Behaviors	Good	Fair	Poor	N/A	Comments
Stopping a Load					
1. Releases button to allow for crane/load travel	☐	☐	☐	☐	
2. Slow, smooth stopping of load in desired position for lowering	☐	☐	☐	☐	
Lowering a Load					
1. Crane stopped and load stable before lowering	☐	☐	☐	☐	
2. Slow, smooth lowering of load in desired position	☐	☐	☐	☐	
3. Lifting devices removed and returned to the	☐	☐	☐	☐	
4. Hoist lifted high enough to avoid personnel contact	☐	☐	☐	☐	
5. Control pendent cleared of traffic aisle	☐	☐	☐	☐	

Comments:

☐ Based on my evaluation, the operator **has successfully** completed the evaluation and is qualified to operate the following equipment:

☐ Based on my evaluation, the operator **has not demonstrated** competence in operating the following equipment:

Equipment Type
Equipment Type

Evaluator Signature

Operator Signature