Module Overview

This module introduces the uses of slings and common rigging hardware. Trainees will learn basic inspection techniques, hitch configurations, and load-handling safety practices, as well as how to use American Society of Mechanical Engineers hand signals.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify and describe the use of slings and common rigging hardware.
2. Describe basic inspection techniques and rejection criteria used for slings and hardware.
3. Describe basic hitch configurations and their proper connections.
4. Describe basic load-handling safety practices.
5. Demonstrate proper use of American Society of Mechanical Engineers (ASME) hand signals.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Select and inspect appropriate slings for a lift.
2. Given various loads, determine the proper hitch to be used.
3. Select and inspect appropriate hardware and/or lifting equipment.
4. Demonstrate and/or simulate the proper techniques for connecting hitches.
5. Demonstrate the proper use of all hand signals according to ASME B30.2 and B30.5.
6. Describe or demonstrate pre-lift safety checks.
7. Demonstrate and/or simulate how to lift the load level.
8. Describe and/or demonstrate safety precautions for attaching and disconnecting a load.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Copies of your local code
- Anchor shackles and chain shackles
- Various types of pins, including:
  - Screw pin shackle
  - Round pin or straight pin shackle
  - Safety shackle
- Damaged shackles and pins
- Damaged and undamaged eyebolts
- Undamaged lifting clamps
- rusty or corroded lifting clamps
- Damaged and undamaged rigging hooks
- Trade Terms Quiz*
- Module Examinations**
- Performance Profile Sheets**

* Located at the back of the Trainee Guide module
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment. Always work in a clean, well-lit, and appropriate work area.

Note

Due to liability issues, trainees under the age of 18 should not perform hoisting maneuvers; therefore, trainees under 18 should not perform the demonstration aspect of Performance Task numbers 4, 7, and 8. The instructor may choose to have trainees simulate the concepts underlying the tasks by using alternative methods.

If you do not have access to rigging hardware or equipment, there are many resources available to you including local contractors, rigging equipment manufacturers, or even your local Training Program.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for this Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover Basic Rigging. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

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<td>F. Laboratory</td>
<td>Have trainees practice selecting and inspecting slings for a lift. This laboratory corresponds to Performance Task 1.</td>
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<td>Session II. Hitches</td>
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<td>A. Vertical Hitch</td>
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<td>B. Choker Hitch</td>
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<td>C. Basket Hitch</td>
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<tr>
<td>D. Laboratory</td>
<td>Have trainees practice selecting appropriate hitches for loads. This laboratory corresponds to Performance Task 2.</td>
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</table>
Session III. Rigging Hardware
A. Shackles
B. Eyebolts
C. Lifting Clamps
D. Rigging Hooks
E. Laboratory
   Have trainees practice selecting and inspecting appropriate hardware and/or
   lifting equipment. This laboratory corresponds to Performance Task 3.

Session IV. Sling Stress and Hoists
A. Sling Stress
B. Operation of Chain Hoists
C. Hoist Safety and Maintenance

Session V. Rigging Operations and Practices
A. Rated Capacity
B. Sling Attachment
C. Hardware Attachment
D. Load Control
E. Laboratory
   Have trainees practice demonstrating proper use of all hand signals and
   completing pre-lift safety checks. These laboratories correspond to
   Performance Tasks 5 and 6.

Session VI. Review and Testing
A. Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from the
      NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results
      to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive
      recognition from NCCER. If applicable, proficiency noted during laboratory
      exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results
      to the Training Program Sponsor.
Module Overview

This module covers how to inspect and use common rigging hardware, slings, and tag lines. It also explains how to select, inspect, use, and maintain special rigging equipment, including block and tackle, chain hoists, ratchet-lever hoists, jacks, and base-mounted drum hoists (tuggers).

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Basic Rigger, Module 00106-09.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify and describe the uses of common rigging hardware and equipment.
2. Perform a safety inspection on hooks, slings, and other rigging equipment.
3. Describe common slings and determine sling capacities and angles.
4. Select, inspect, use, and maintain special rigging equipment, including:
   • Block and tackle (bull rigging)
   • Chain hoists
   • Ratchet-lever hoists
   • Jacks
   • Base-mounted drum hoists (tuggers)
5. Inspect heavy rigging hardware.
6. Tie knots used in rigging.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Perform a safety inspection on hooks, slings, and other rigging equipment.
2. Select, inspect, and use special rigging equipment, including:
   • Block and tackle (bull rigging)
   • Chain hoists
   • Ratchet-lever hoists
   • Jacks
   • Base-mounted drum hoists (tuggers)
3. Tie knots in rigging.

Materials and Equipment

Multimedia projector and screen
Basic Rigger / Intermediate Rigger / Advanced Rigger PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Manufacturer’s literature on different rigging hooks
Various rigging hooks with wear, cracks, and corrosion
Manufacturer’s literature on shackles
Various types of shackles
Various eyebolts
Various lifting lugs
Turnbuckles
Manufacturer’s literature on plate clamps
Various rigging plates and links
Various types of slings
ASME B30.9, Slings
A rigging pocket guide
Samples of wire rope that have failed inspection
Rope for tying knots
Block and tackle lifting system

continued
Sample loads for lifting
Spur-gear chain hoist
Electric chain hoist
Ratchet-lever hoist or come-along
Ratchet jack
Screw jack
Hydraulic jack
Base-mounted drum hoists (tuggers)
Module Examinations*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use various types of hoists, jacks, and base-mounted drum hoists. Ensure that all trainees are briefed on lifting safely and any other shop safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover Rigging Equipment. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

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<td>9. Spreader and Equalizer Beams</td>
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</tbody>
</table>
Session II. Slings; Tag Lines

A. Slings
   1. Sling Capacity
   2. Sling Care and Storage
   3. Chain Slings

B. Laboratory
   Have trainees practice performing a safety inspection on hooks, slings, and other rigging equipment. This laboratory corresponds to Performance Task 1.

C. Tag Lines

D. Laboratory
   Have trainees practice tying knots used in rigging. This laboratory corresponds to Performance Task 3.

Session III. Block and Tackle; Chain Hoists; Ratchet-Lever Hoists and Come-Alongs; Jacks; Base-Mounted Drum Hoists

A. Block and Tackle (Bull Rigging)

B. Chain Hoists
   1. Spur-Geared Chain Hoists
   2. Electric Chain Hoists
   3. Care of Chain Hoists

C. Ratchet-Lever Hoists and Come-Alongs

D. Jacks
   1. Ratchet Jacks
   2. Screw Jacks
   3. Hydraulic Jacks
   4. Inspecting and Using Jacks

E. Base-Mounted Drum Hoists (Tuggers)

F. Laboratory
   Have trainees practice selecting, inspecting, and using special rigging equipment. This laboratory corresponds to Performance Task 2.

Session IV. Review and Testing

A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module covers communications, basic rigging safety precautions, lift planning, and load and sling calculations. It also covers load charts and load balancing.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Basic Rigger, Modules 00106-09 and 38101-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify and use the correct ASME hand signals to guide a crane operator.
2. Identify basic rigging and crane safety procedures and determine the center of gravity of a load.
3. Identify the pinch points of a crane and explain how to avoid them.
4. Identify site and environmental hazards associated with rigging.
5. Properly attach rigging hardware for routine lifts and pipe lifts.
6. Explain the importance of sling tension calculations.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Use and interpret hand signals.
2. Determine the center of gravity of a load.
3. Properly attach rigging hardware for routine lifts and pipe lifts.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Walkie-talkies
- Throat microphone
- Hardwired communication system
- ASME B30.5 Consensus Standard 29 CFR 1926.550
- Completed lift plan
- Crane manufacturer’s literature
- Typical teeter-totter and weights
- Various lifting eyebolts
- Rigging hardware
- Module Examinations*
- Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.
Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover Rigging Practices. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

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<td>C. Laboratory</td>
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<tr>
<td>Have trainees practice using and interpreting hand signals. This laboratory corresponds to Performance Task 1.</td>
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<td>A. Emergency Response</td>
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<td>3. Hazardous Weather</td>
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</table>
Session VI. Review and Testing

A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module provides an overview of personnel lifting and lift planning, and introduces crane load charts and load balancing. It explains how the center of gravity is calculated and affects the lift. It also covers sling selection, and explains the uses of jacks, tuggers, hoists, skids, and rollers.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Basic Rigger.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Describe the basic requirements to lift personnel.
2. Explain how a sling stress is determined.
3. Describe the basic elements of a lift plan.
4. Explain the purpose of a load chart.
5. Calculate and explain how the center of gravity is determined.
6. Given a particular load, select the appropriate sling(s) for a lift.
7. Describe how jacks, hoists, skids, and rollers are used to move load laterally.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Calculate the center of gravity of a load.
2. Given a particular load, select the appropriate sling(s) for a lift.

Materials and Equipment

Multimedia projector and screen
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
OSHA regulations on lifting personnel
OSHA guidance on personnel platforms:
   Crane or Derrick Suspended Personnel Platforms
Various types of slings and hitches
Sample lift plan

Manufacturer’s literature for different types of cranes
Sample load charts
ASME B30.5
ANSI/SAE J987
Teeter-totter and weights
Several jacks
Grip hoist
Tuggers
Rollers
Skids
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located in the back of this module.
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand tools and slings. Ensure that trainees are briefed on shop safety policies and hand tool safety.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover Intermediate Rigging. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

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<td>4. Choker Hitches</td>
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<td>D. Laboratory</td>
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<tr>
<td>Have trainees practice selecting the appropriate sling(s) for a lift. This laboratory corresponds to Performance Task 2.</td>
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Session III. Load Balancing; Special Equipment Used for Lateral Movement of Loads

A. Load Balancing
   1. Center of Gravity
   2. Center of Gravity and Leverage

B. Laboratory
   Have trainees practice calculating the center of gravity of a load. This laboratory corresponds to Performance Task 1.

C. Special Equipment Used for Lateral Movement of Loads
   1. Jacking
   2. Grip Hoists
   3. Skids
   4. Rollers

Session IV. Review and Testing

A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module covers the components of wire rope, wire rope inspection, load block inspection, sheave inspection, proper installation of wire rope, maintenance guidelines, and end terminations and preparations.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Basic Rigger and Intermediate Rigger, Module 38201-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Describe how wire rope is constructed and secured.
2. Determine the allowable working load of wire rope.
3. Perform a wire rope inspection.
4. Identify wire rope replacement criteria and describe procedures for replacement.
5. Describe the proper maintenance procedures for wire rope.
6. Describe proper procedures and methods of reeving all wire ropes and multiple-part lines (D/d ratio).
7. Describe the advantages of using multi-part reeving.

Performance Task

Under the supervision of the instructor, the trainee should be able to do the following:

1. Perform a wire rope inspection.

Materials and Equipment

Multimedia projector and screen
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Wire rope, including:
  Right and left regular lay
  Right and left lang lay
  Right and left alternate lay
Wire rope with various strand patterns
Wire rope with taped end and seizing
  Located in the back of this module.
Wire rope with various end fittings
Wedge socket assembly and manufacturer’s literature on wedge sockets
U-bolt and fist grip clip
Wire Rope User’s Manual
Wire rope with deformations, including:
  Birdcaging
  Fatigue breaks
  Kinking
Load block with safety latch and safety specifications
Sheave
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located in the back of this module.
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand tools and wire rope. Ensure that trainees are briefed on shop safety policies and hand tool safety.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover Wire Rope. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

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<tr>
<td>2. Inspection Criteria</td>
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<td>3. Laboratory</td>
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<td>4. Sheave and Load Block Inspection</td>
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<td>5. D/d Ratio</td>
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<td>6. Maintenance Guidelines</td>
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<td>Session III. Wire Rope Reeving; Reeving a Drum</td>
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<td>A. Wire Rope Reeving</td>
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<td>1. Determining Parts of Line</td>
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<td>2. Block Twisting</td>
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<td>B. Reeving a Drum</td>
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<tr>
<td>Session IV. Review and Testing</td>
<td></td>
</tr>
</tbody>
</table>
A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module provides a step-by-step look at short- and long-lattice and telescopic boom assembly and disassembly. It also provides examples of the procedures used for assembling crane boom attachments or an A-frame jib.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Basic Rigger and Intermediate Rigger, Modules 38201-11 and 38202-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Determine if there is adequate space and resources for crane assembly and disassembly.
2. Identify boom components.
3. Define the relationship of the counterweight to the assembly and disassembly of the boom.
4. Assemble and disassemble a boom.
5. Assemble and disassemble a jib at a boom top.
6. Define and evaluate foundation requirements for boom erection.
7. Assemble and disassemble boom attachments.

Performance Task

Under the supervision of the instructor, the trainee should be able to do the following:

1. Assemble and disassemble boom attachments.

Materials and Equipment

<table>
<thead>
<tr>
<th>Multimedia projector and screen</th>
<th>Blocking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Rigger / Intermediate Rigger / Advanced Rigger PowerPoint® Presentation Slides</td>
<td>Tools and rigging hardware for attachment of boom sections</td>
</tr>
<tr>
<td>Computer</td>
<td>Copies of site safety manual or procedures</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Copies of mobile crane operator’s manuals</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Mobile crane</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td>Swing-away lattice extension</td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td>A-frame jib</td>
</tr>
<tr>
<td>Lattice boom crane manufacturer’s assembly and disassembly instructions</td>
<td>Manufacturer’s assembly and disassembly instructions for crane and components</td>
</tr>
<tr>
<td>Jib manufacturer’s assembly instructions</td>
<td>Auxiliary single-sheave boom head</td>
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<tr>
<td>Manufacturer’s assembly instructions for a short lattice boom</td>
<td>Wire rope</td>
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<tr>
<td>Manufacturer’s assembly instructions for a long lattice boom</td>
<td>Blocking</td>
</tr>
<tr>
<td>Lattice boom crane and counterweights</td>
<td>Tools and accessories to attach and stow crane components</td>
</tr>
<tr>
<td>Short and long lattice boom sections</td>
<td>Copies of the Quick Quiz*</td>
</tr>
<tr>
<td>Jib and rigging hardware</td>
<td>Module Examinations**</td>
</tr>
<tr>
<td></td>
<td>Performance Profile Sheets**</td>
</tr>
</tbody>
</table>

* Located in the back of this module.
**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to assemble and disassemble cranes. Review site safety procedures and site evacuation procedures. Ensure that all trainees are familiar with hand signals and other site communication procedures. Brief trainees on pinching and crushing hazards associated with assembling and disassembling cranes. This module may require trainees to visit a construction site. Ensure that all trainees are briefed on site safety procedures.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover Boom Assembly and Disassembly. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction; Pre- and Post-Assembly Considerations; Counterweight Considerations; Boom Parts</td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Pre- and Post-Assembly Considerations</td>
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<td>C. Counterweight Considerations</td>
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<tr>
<td>D. Boom Parts</td>
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<tr>
<td>Session II. Lattice Boom Assembly</td>
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<tr>
<td>A. Lattice Boom Assembly</td>
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<tr>
<td>1. Assembling Short Lattice Booms</td>
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<tr>
<td>2. Assembling Long Lattice Booms</td>
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<tr>
<td>Session III. Jib Assembly</td>
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<tr>
<td>A. Jib Assembly</td>
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<tr>
<td>Session IV. Disassembly of Lattice Booms</td>
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<tr>
<td>A. Disassembly of Lattice Booms</td>
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<tr>
<td>Session V. Swing-Away Lattice Extension</td>
<td></td>
</tr>
<tr>
<td>A. Swing-Away Lattice Extension</td>
<td></td>
</tr>
<tr>
<td>1. Installing a Swing-Away Lattice Extension</td>
<td></td>
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<tr>
<td>2. Stowing a Swing-Away Lattice Extension</td>
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</tbody>
</table>
Session VI. A-Frame Jib
A. A-Frame Jib
   1. Installing an A-Frame Jib
   2. Stowing an A-Frame Jib

Sessions VII. Auxiliary Single-Sheave Boom Head; Rope Installation
A. Auxiliary Single-Sheave Boom Head
B. Laboratory
   Have trainees practice installing and removing an auxiliary single-sheave boom head.
C. Wire Rope
D. Laboratory
   Have trainees practice properly installing wire rope and all lifting attachments.
E. Laboratory
   Have trainees practice assembling and disassembling boom attachments.
   This laboratory corresponds to Performance Task 1.

Session VIII. Review and Testing
A. Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module explains the basic principles of cranes with an in-depth discussion of the terminology and nomenclature. The principles of a fulcrum and lever and center of gravity are explained in relation to crane operations.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Intermediate Rigger, Modules 38201-11 through 38203-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify the types of mobile cranes found on construction sites.
2. Identify mobile crane components and boom attachments.
3. Identify mobile crane reeving patterns.
4. Define the effects of leverage as it applies to mobile cranes.
5. Define the factors affecting mobile crane lifting capacities.
6. Discuss the criteria for a critical lift.
7. Describe the effects of load movement on measured radius.
8. Define the effects of a submerged lift on crane capacity.

Performance Tasks

There are no performance tasks for this module.

Materials and Equipment

Multimedia projector and screen
Basic Rigger / Intermediate Rigger / Advanced Rigger PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment, including:
   Hard hats
   Work gloves
   Safety harnesses
   Safety shoes
   Ear protection

Model crane (hydraulic boom)
Model crane (lattice boom)
Crane blocks or pulley systems
Materials to construct a simple teeter-totter
Materials of different weights to use as loads on the teeter-totter
Matting material to support a crane
Copies of company safety policies and procedures
Copies of manufacturers’ operating manuals and load charts
Fishing pole
Small swimming pool
Module Examinations*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize heavy equipment and work site safety. The topics in this module require the trainee to observe cranes in different configurations. This may require that the trainees visit job sites or crane yards. Ensure that the trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2 1/2 hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover Basic Principles of Cranes. You will need to adjust the time required for testing based on your class size and resources.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Mobile Construction Cranes; Crane Terminology; Crane Reeving Patterns</strong></td>
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<tr>
<td>A. Introduction</td>
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<td>B. Mobile Construction Cranes</td>
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<td>3. Wheeled Rough-Terrain Cranes</td>
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<td>C. Crane Terminology</td>
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<td>1. Component Terminology</td>
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<td>2. Operations Terminology</td>
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<td>3. Counterweights</td>
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<td>4. Jibs</td>
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<td>5. Pendants and Hoist Lines</td>
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<td>6. Telescoping Boom</td>
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<td>D. Crane Reeving Patterns</td>
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<tr>
<td><strong>Session II. Factors Affecting Lifting Capacity, Part One</strong></td>
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<tr>
<td>A. Factors Affecting Lifting Capacity</td>
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<tr>
<td>1. Ground Conditions</td>
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<td>2. Bearing Surface</td>
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<td>3. Crane Base</td>
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<td>4. Center of Gravity</td>
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<tr>
<td>5. Quadrant of Operation</td>
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</tbody>
</table>
Sessions III and IV. Factors Affecting Lifting Capacity, Part Two

A. Factors Affecting Lifting Capacity
   1. Boom Length, Boom Angle, Operating Radius, and Boom Point Elevation
   2. Swing Out, Side Loading, and Dynamic Loading
   3. Capacity (Load) Charts
   4. Wind Effect on Stability

Session V. Critical Lifts; Boom Stops and Angle Indicators; Submerged Lifts

A. Critical Lifts
B. Boom Stops and Angle Indicators
   1. Crane Safety Features
C. Submerged Lifts

Session VI. Review and Testing

A. Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module covers specialized rigging techniques and equipment. Load dynamics are explained. The use of specialized equipment including cribbing, slings, and beams is described.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Basic Rigger and Intermediate Rigger.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Explain how the center of gravity of the load affects the rigging.
2. Explain how the weight of the load and the position of the crane boom affect the load capacity of the crane.
3. Explain how cribbing is used to support loads.
4. Select the appropriate spreader bars or equalizer beam for a given load.
5. Demonstrate the ability to determine the center of gravity for a non-symmetrical load.
6. Given a particular load, select the appropriate sling(s) for a lift.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Select the appropriate spreader bars or equalizer beam for a given load.
2. Demonstrate the ability to determine the center of gravity for a non-symmetrical load.
3. Given a particular load, select the appropriate sling(s) for a given lift.

Materials and Equipment

Multimedia projector and screen
Basic Rigger/Intermediate Rigger/Advanced Rigger PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper

Appropriate personal protective equipment
Cribbing
Copies of ASME B30.5-2004
Beams and spreader bars
Slings
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located in the back of this module.
**Available on the IRC (Instructor Resource Center) at www.NCCERContrenIRC.com using the access code supplied with the Annotated Instructor’s Guide.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require trainees to visit construction sites. Brief trainees on site safety procedures. This module requires trainees to use specialized rigging equipment and may require trainees to work around cranes. Ensure that all trainees know site safety and crane safety procedures and emphasize crane safety.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover Advanced Rigging. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td>Sessions I and II. Introduction; Load Dynamics</td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Load Dynamics</td>
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<tr>
<td>1. Rotational Forces or Moments</td>
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<tr>
<td>2. Crane Stability</td>
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<tr>
<td>C. Laboratory</td>
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</tr>
<tr>
<td>Have trainees practice determining the center of gravity for a non-symmetrical load. This laboratory corresponds to Performance Task 2.</td>
<td></td>
</tr>
<tr>
<td>Session III. Special Equipment Used in Heavy Rigging</td>
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<tr>
<td>A. Special Equipment Used in Heavy Rigging</td>
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<tr>
<td>1. Cribbing</td>
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<tr>
<td>2. Inclined Planes</td>
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<tr>
<td>Sessions IV and V. Slings</td>
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<tr>
<td>A. Slings</td>
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<tr>
<td>1. Sling Tensions</td>
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<tr>
<td>2. Bridle Hitches</td>
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<tr>
<td>3. Basket Hitches</td>
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<tr>
<td>4. Choker Hitches</td>
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<tr>
<td>B. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Have trainees practice selecting the proper sling(s) for a given lift. This laboratory corresponds to Performance Task 3.</td>
<td></td>
</tr>
</tbody>
</table>
Sessions VI and VII. Using Beams; Rigging Rebar Bundles

A. Using Beams
   1. Adjustable Beams
   2. Equalizer Beams

B. Laboratory
   Have trainees practice selecting the appropriate beam or spreader bar for a given lift. This laboratory corresponds to Performance Task 1.

C. Rigging Rebar Bundles
   1. Unloading Procedure
   2. Hoisting Equipment

Session VIII. Review and Testing

A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module provides in-depth information on lift plan implementation, including the use of load charts. The topics covered include reference information, calculations, single- and multiple-crane lifting, critical lifts, and engineering considerations.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Basic Rigger, Intermediate Rigger, and Advanced Rigger, Module 38301-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Reference available material that will assist in a safe lifting operation.
2. Describe the importance of following and adhering to a lift plan.
3. Define the terms on a load/capacity chart to indicate boom angle, load radius, and boom length.
4. Calculate crane capacity using a load/capacity chart.
5. Identify the differences between on-rubber and on-outrigger charts.
6. Provide the necessary information requested on a lift plan.
7. Calculate additions and deductions involved in lifting operations.
8. Identify existing operations that need special approval.
9. Identify engineering considerations in a lift plan.
10. Identify the various types of lift plans and their differences.
11. Identify the importance of lift plan implementation.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Fill out portions of a critical lift plan as given/directed by the instructor.
2. Perform single-crane lifting calculations.
3. Perform multiple-crane lifting calculations.
4. Identify boom angle, boom length, and load radius on a load/capacity chart.
5. Identify the requirements of the on-rubber load/capacity chart.
6. Identify the requirements of the on-outrigger load/capacity chart.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- OSHA 29 CFR 1910.180
- OSHA 29 CFR 1926.550
- ASME B30.5
- ANSI/SAE J987
- Copies of a critical lift plan
- Crane(s) and operator’s manuals available for performing lifts
- Copies of site emergency procedures
- Copies of sample pre-lift worksheets and lift plans
- Load/capacity charts for different machines
- Copies of site safety manual or procedures
- Videotape: Lift Calculations
- TV and VCR
- Load moment indicator
- Module Examinations*
- Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require trainees to visit construction sites and observe crane operations. Brief trainees on site safety and crane safety procedures.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 40 hours are suggested to cover Lift Planning. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
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</tr>
<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Lift Plan</td>
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<tr>
<td>C. Laboratory</td>
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</tr>
<tr>
<td>Have trainees practice filling out portions of a lift plan.</td>
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<tr>
<td><strong>Sessions II and III. Calculations for Single Crane Lifts</strong></td>
<td></td>
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<tr>
<td>A. Calculations for Single-Crane Lifts</td>
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<tr>
<td>B. Laboratory</td>
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<tr>
<td>Have trainees practice performing calculations for single-crane lifts.</td>
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<tr>
<td>This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td><strong>Sessions IV through VI. Calculations for Multiple Crane Lifts</strong></td>
<td></td>
</tr>
<tr>
<td>A. Calculations for Multiple-Crane Lifts</td>
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<tr>
<td>B. Laboratory</td>
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<tr>
<td>Have trainees practice performing calculations for multiple-crane lifts.</td>
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<tr>
<td>This laboratory corresponds to Performance Task 3.</td>
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<tr>
<td><strong>Session VII. Lift Plan Laboratory</strong></td>
<td></td>
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<tr>
<td>A. Laboratory</td>
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<tr>
<td>Have trainees practice preparing a lift plan based on criteria provided by the instructor.</td>
<td></td>
</tr>
</tbody>
</table>
Sessions VIII and IX. Crane Configuration, Part One
A. Boom Length, Boom Angle, and Load Radius
B. Laboratory
   Have trainees practice identifying boom angle, boom length, and load radius on a load/capacity chart. This laboratory corresponds to Performance Task 4.
C. Quadrants of Operation
D. Configuration of the Crane Base
E. Laboratory
   Have trainees practice identifying requirements of the on-rubber load/capacity chart and the on-outrigger load/capacity chart. This laboratory corresponds to Performance Tasks 5 and 6.
F. Tower and Ring Attachments

Sessions X and XI. Crane Configuration, Part Two
A. Counterweight Configurations
B. Laboratory
   Have trainees practice identifying load/capacity charts that are used in different configurations.
C. Deduction Charts
D. Laboratory
   Have trainees practice identifying parts of line and counterweight considerations in load/capacity chart information.

Sessions XII through XIV. Calculating Crane Capacity
A. Calculating Crane Capacity
B. Laboratory
   Have trainees practice calculating crane capacities using load/capacity charts. This laboratory corresponds to Performance Task 1.

Session XV. Critical Lifts; Engineering Considerations; Lift Plan Implementation
A. Critical Lifts
B. Engineering Considerations
C. Lift Plan Implementation
D. Laboratory
   Have trainees practice filling out portions of a critical lift plan. This laboratory corresponds to Performance Task 1.

Session XVI. Review and Testing
A. Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module provides an in-depth discussion of the **ASME B30.23** and **29 CFR 1926.550(g)** requirements as it presents advanced operating techniques for hoisting personnel.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed **Basic Rigger; Intermediate Rigger; and Advanced Rigger**, Modules 38301-11 and 38302-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify which federal regulations and consensus standards apply to hoisting personnel.
2. Visually inspect the platform, suspension system, and attachment points.
3. Define operation techniques for hoisting personnel near power lines.

Performance Task

Under the supervision of the instructor, the trainee should be able to do the following:

1. Visually inspect the platform, suspension system, and attachment points.

Materials and Equipment

- Multimedia projector and screen
- **Basic Rigger/Intermediate Rigger/Advanced Rigger**
  - PowerPoint® Presentation Slides
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Copies of OSHA and ASME regulations
  - **OSHA 29 CFR 1926.104, 1926.106, 1926.550(g), and 1926.753**
- OSHA document: **Crane or Derrick Suspended Personnel Platforms**
- **ASME B30.23**
- Fall protection equipment
- Fall protection safety video or DVD
- TV and VCR or DVD player
- Personnel platform
- Personnel platform pre-lift inspection form
- Rigging hardware for personnel platform
- Copies of the Quick Quiz*
- Module Examinations**
- Performance Profile Sheets**

* Located in the back of this module.
** Available on the IRC (Instructor Resource Center) at www.NCCERContrenIRC.com using the access code supplied with the Annotated Instructor’s Guide.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require trainees to observe crane operations. Review site safety procedures and site evacuation procedures. Ensure that all trainees are familiar with hand signals and other site communication procedures. Brief trainees on pinching and crushing hazards associated with crane operations. This module requires trainees to work with lifting equipment. Brief trainees on slip and fall hazards of platform work.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover Personnel Lifts. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Fall Protection; Platform Requirements; Boom-Attached Platform Requirements; Crane and Operational Requirements; Personnel Platform Inspection; Trial Lift</strong></td>
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<td>A. Introduction</td>
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<td>B. Fall Protection</td>
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<td>C. Platform Requirements</td>
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<td>1. Design Criteria</td>
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<td>2. Platform Specifications</td>
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<td>D. Boom-Attached Platform Requirements</td>
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<td>E. Crane and Operational Requirements</td>
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<tr>
<td>1. Operational Criteria</td>
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<td>2. Instruments and Components</td>
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<td>3. Work Practices</td>
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<td>4. Traveling</td>
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<td>F. Personnel Platform Inspection</td>
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<td>1. ASME-Prescribed Personnel Platform Inspection</td>
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<td>G. Laboratory</td>
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<tr>
<td>Have trainees practice inspecting the platform, suspension system and attachment points. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>H. Trial Lift</td>
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<tr>
<td>1. Proof Testing</td>
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Session II. Advanced Operations Techniques for Hoisting Personnel; Review and Testing

A. Advanced Operations Techniques for Hoisting Personnel

B. Review

C. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

D. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.