

Module Overview

This module provides an overview of the tower crane industry and highlights the duties and responsibilities of a tower crane operator. It also discusses ASME and OSHA standards, as well as career opportunities and operator requirements.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*.

Objectives

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

1. Identify career opportunities in the tower crane industry.
2. Describe the duties and responsibilities of tower crane operators.
3. Describe the physical requirements for tower crane operators.
4. Name the different categories of tower cranes and describe how each type is used.
5. Identify common tower crane attachments and explain how each is used.

Performance Tasks

This is a knowledge-based module; there are no Performance Tasks.

Materials and Equipment List

Pencils and scratch paper	Multimedia projector and screen
Whiteboard/chalkboard	Desktop or laptop computer
Markers/chalk	Copy of <i>ASME Standard B30.3, Construction Tower Cranes</i>
Tower Crane Operator PowerPoint® Presentation Slides (ISBN 0-13-213797-6)	Module Examination*

*Located in the Test Booklet

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that all trainees are briefed on appropriate field 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 is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ASME Standard B30.3-2009, Construction Tower Cranes, 2009. New York, NY: American Society of Mechanical Engineers.

ASME Standard B30.20-2006, Below-the-Hook Lifting Devices, 2006. New York, NY: American Society of Mechanical Engineers.

Crane Safety: A Guide to OSHA Compliance and Injury Prevention, 1999. Carl O. Morgan. Rockville, MD: ABS Group, Inc.

Occupational Safety and Health Standards for the Construction Industry, 29 CFR, Part 1926, Latest Edition. Washington, DC: OSHA Department of Labor, U.S. Government Printing Office.

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 *Orientation to the Trade*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	Planned Time
Session I. Introduction; The Crane Industry; General Standards; Crane Types and Uses; Attachments	
A. Introduction	_____
B. The Crane Industry	_____
1. Opportunities and Career Paths	_____
C. General Standards	_____
1. ASME Standard B30.3	_____
2. Crane Operator’s Typical Responsibilities	_____
D. Cranes Types and Uses	_____
1. Hammerhead (Horizontal Jib) Tower Cranes	_____
2. Luffing Boom Tower Cranes	_____
3. Self-Erecting Tower Cranes	_____
E. Attachments	_____
Session II. Your Training Program; Responsibilities of the Employee; Human Relations; Employer and Employee Safety Obligations; Review and Testing	
A. Your Training Program	_____
1. Apprenticeship Program	_____
B. Responsibilities of the Employee	_____
1. Professionalism	_____
2. Honesty	_____
3. Loyalty	_____
4. Willingness to Learn	_____
5. Willingness to Take Responsibility	_____
6. Willingness to Cooperate	_____
7. Rules and Regulations	_____
8. Tardiness and Absenteeism	_____

C. Human Relations

1. Making Human Relations Work
2. Human Relations and Productivity
3. Attitude
4. Maintaining a Positive Attitude

D. Employer and Employee Safety Obligations

E. Module Review

F. Module Examination

1. Trainees must score 70% 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 identifies the three main types of tower cranes and their components, including operator aids and base support systems. It also explains the basic scientific principles associated with tower crane operation, and discusses the factors that affect lifting capacities.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum* and *Tower Crane Operator*, Module 48101-10.

Objectives

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

1. Identify the types of tower cranes.
2. Identify tower crane components.
3. Define the effects of leverage as it applies to tower cranes.
4. Define the factors affecting tower crane lifting capacities.
5. Define a critical lift.
6. Identify operator aids and safety devices.
7. Identify base support systems for tower cranes.

Performance Tasks

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

1. Identify the basic components of one or more tower cranes.
2. Identify operator aids for one or more tower cranes.
3. Identify safety devices for one or more tower cranes.

Materials and Equipment List

Pencils and paper
Whiteboard/chalkboard
Markers/chalk
Tower Crane Operator PowerPoint® Presentation
Slides (ISBN 0-13-213797-6)
Multimedia projector and screen
Desktop or laptop computer

Calculator
Appropriate personal protective equipment
Access to one or more tower crane(s)
Tower crane simulator (optional)
Module Examinations*
Performance Profile Sheets*

*Located in the Test Booklet

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that all trainees are briefed on appropriate field safety procedures. If the training center does not have a tower crane on site, this module will require that the trainees visit one or more job-sites in order to identify crane components. Ensure that trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ASME Standard B30.3-2009, Construction Tower Cranes, 2009. New York, NY: American Society of Mechanical Engineers.

Crane Safety: A Guide to OSHA Compliance and Injury Prevention, 1999. Carl O. Morgan. Rockville, MD: ABS Group, Inc.

Occupational Safety and Health Standards for the Construction Industry, 29 CFR, Part 1926, Latest Edition. Washington, DC: OSHA Department of Labor, U.S. Government Printing Office.

Rigging Handbook, 2007. Jerry A. Klinke. Stevensville, MI: ACRA Enterprises, Inc.

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 *Basic Principles of Tower Cranes*. 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.

Topic	Planned Time
Session I. Introduction; Tower Cranes	
A. Introduction	_____
B. Tower Cranes	_____
1. Hammerhead Tower Cranes	_____
2. Luffing Boom Tower Cranes	_____
3. Self-Erecting Tower Cranes	_____
Session II. Tower Crane Terminology	
A. Tower Crane Terminology	_____
1. Component Terminology	_____
2. Operations Terminology	_____
Session III. Tower Crane Components, Part One	
A. Tower Crane Components	_____
1. Counterweights	_____
2. Pendants and Guys	_____
3. Travel Equipment	_____
4. Climbing Equipment	_____
5. Controls	_____
Session IV. Tower Crane Components, Part Two; Laboratory	
A. Tower Crane Components	_____
1. Load Hoisting and Boom Luffing (Boom Hoist) Equipment	_____
2. Load Trolleys	_____
3. Base Support Systems	_____
B. Laboratory	_____
Have trainees practice identifying the basic components of one or more tower cranes. This laboratory corresponds to Performance Task 1.	

Session V. Factors Affecting Lifting Capacity

A. Factors Affecting Lifting Capacity

1. Load Ratings
2. Tower Height
3. Operating (Load) Radius
4. Wind Velocity
5. Dynamic and Shock Loading
6. Side Loading

Session VI. Critical Lifts

A. Critical Lifts

Session VII. Instrumentation and Safety Devices; Laboratory

A. Instrumentation and Safety Devices

1. Load Limiting Devices
2. Operator Aids

B. Laboratory

1. Have trainees practice identifying operator aids for one or more tower cranes. This laboratory corresponds to Performance Task 2.
2. Have trainees practice identifying safety devices for one or more tower cranes. This laboratory corresponds to Performance Task 3.

Session VIII. Review and Testing

A. Module Review

B. Module Examination

1. Trainees must score 70% 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 Performing 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 introduces various safety aspects of tower crane operation, including equipment inspection, rigging, swing paths, and site hazard identification. It also discusses response plans for various emergency situations, including fire, equipment malfunction, and adverse weather conditions.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum* and *Tower Crane Operator*, Modules 48101-10 and 48102-10.

Objectives

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

1. Identify basic tower crane safety and rigging procedures.
2. Explain load control through the swing path of a tower crane.
3. Identify site and environmental hazards associated with tower cranes.

Performance Tasks

This is a knowledge-based module; there are no Performance Tasks.

Materials and Equipment List

Pencils and paper	Copy of <i>ASME Standard B30.3, Construction Tower Cranes</i>
Whiteboard/chalkboard	
Markers/chalk	Copy of <i>OSHA Standard 29 CFR, Part 1926</i>
Tower Crane Operator PowerPoint® Presentation Slides (ISBN 0-13-213797-6)	Manufacturer's operating manual(s) for one or more tower cranes
Multimedia projector and screen	Appropriate personal protective equipment
Desktop or laptop computer	Module Examination*

* Located in the Test Booklet

Safety Considerations

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

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ASME Standard B30.3-2009, Construction Tower Cranes, 2009. New York, NY: American Society of Mechanical Engineers.

ASME Standard B30.20-2006, Below-the-Hook Lifting Devices, 2006. New York, NY: American Society of Mechanical Engineers.

Crane Safety: A Guide to OSHA Compliance and Injury Prevention, 1999. Carl O. Morgan. Rockville, MD: ABS Group, Inc.

Handbook of OSHA Construction Safety and Health, 2006. Charles D. Reese. Boca Raton, FL: Taylor & Francis Group, LLC.

Occupational Safety and Health Standards for the Construction Industry, 29 CFR, Part 1926, Latest Edition. Washington, DC: OSHA Department of Labor, U.S. Government Printing Office.

Rigging Handbook, 2007. Jerry A. Klinke. Stevensville, MI: ACRA Enterprises, Inc.

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 *Tower Crane Safety*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	Planned Time
Session I. Introduction; General Tower Crane Safety, Part One	
A. Introduction	_____
B. General Tower Crane Safety	_____
1. Personal Protection	_____
2. Equipment and Supervision	_____
3. Basic Rigging Precautions	_____
Session II. General Tower Crane Safety, Part Two	
A. General Tower Crane Safety	_____
1. ASME Hand Signals	_____
2. Swing Path, Load Control, and Tag Lines	_____
3. Load-Handling Safety	_____
Session III. Safety Standards	
A. Safety Standards	_____
Session IV. Working Around Power Lines; Site Safety	
A. Working Around Power Lines	_____
B. Site Safety	_____
1. Site Hazards and Restrictions	_____
2. Manufacturer's Requirements and Restrictions	_____
Session V. Emergency Response	
A. Emergency Response	_____
1. Fire	_____
2. Malfunctions During Lifting Operations	_____
3. Hazardous Weather	_____

Session VI. Using Cranes to Lift Personnel; Review and Testing

A. Using Cranes to Lift Personnel

B. Module Review

C. Module Examination

1. Trainees must score 70% 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 describes the use and inspection of basic equipment and hardware used in rigging, including slings, wire rope, chains, lifting beams, and attaching hardware such as shackles, eyebolts, and hooks. It also explains sling capacities and sling angles.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum* and *Tower Crane Operator*, Modules 48101-10 through 48103-10.

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 common rigging hardware and equipment.
3. Identify common slings and describe their uses.
4. Determine sling capacities and sling angles.

Performance Tasks

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

1. Configure a sling to produce a single leg/single wrap basket hitch.
2. Configure a sling to produce a single leg/double wrap basket hitch.
3. Configure a sling to produce a single leg/single wrap choker hitch.
4. Configure a sling to produce a single leg/double wrap choker hitch.
5. Select the correct tag line for a specified load.

Materials and Equipment List

Pencils and paper	One-foot samples of wire rope of various grades
Whiteboard/chalkboard	Spooled wire rope
Markers/chalk	Wire seizing
Tower Crane Operator PowerPoint® Presentation Slides (ISBN 0-13-213797-6)	Wire cutters
Multimedia projector and screen	Wire lubricant and applicator pan or can
Desktop or laptop computer	Wire rope, synthetic web, and metal mesh slings
Appropriate personal protective equipment	Examples of damaged rigging hardware, wire rope, and slings
Access to a tower crane with loads of varying shape and weight for rigging practice	Tag lines
Various types of rigging hardware, including hooks, shackles, eyebolts, lifting lugs, turnbuckles, beam clamps, plate clamps, rigging plates and links, spreader beams, equalizer beams, and lifting beams	Module Examination*
	Performance Profile Sheets*

* Located in the Test Booklet

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that all trainees are briefed on appropriate field safety procedures. If the training center does not have a tower crane on site, this module will require that the trainees visit one or more job-sites in order to demonstrate safe rigging operations. Ensure that trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Occupational Safety and Health Standards for the Construction Industry, 29 CFR, Part 1926, Latest Edition. Washington, DC: OSHA Department of Labor, U.S. Government Printing Office.
Rigging Handbook, 2007. Jerry A. Klinke. Stevensville, MI: ACRA Enterprises, Inc.

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 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.

Topic	Planned Time
Session I. Introduction; Rigging Hardware	
A. Introduction	_____
B. Rigging Hardware	_____
1. Hooks	_____
2. Shackles	_____
3. Eyebolts	_____
4. Lifting Lugs	_____
5. Turnbuckles	_____
6. Beam Clamps	_____
7. Plate Clamps	_____
8. Rigging Plates and Links	_____
9. Spreader, Equalizer, and Lifting Beams	_____
Session II. Wire Rope	
A. Wire Rope	_____
1. Wire Rope Construction	_____
2. Classification of Wire Ropes	_____
3. Handling Wire Rope	_____
4. Lubrication of Wire Rope	_____
5. Break-In and Maintenance of Wire Rope	_____
6. Inspection of Wire Rope	_____

Session III. Wire Rope and Synthetic Web Slings; Chain Slings; Laboratory

A. Wire Rope and Synthetic Web Slings

- 1. Wire Rope Slings
- 2. Synthetic Web Slings
- 3. Metal Mesh Slings
- 4. Sling Angles
- 5. Sling Capacity
- 6. Sling Care and Storage

B. Chain Slings

- 1. Chain Sling Storage
- 2. Chain Sling Care and Inspection

C. Laboratory

- 1. Have trainees practice configuring a sling to produce a single leg/single wrap basket hitch. This laboratory corresponds to Performance Task 1.
- 2. Have trainees practice configuring a sling to produce a single leg/double wrap basket hitch. This laboratory corresponds to Performance Task 2.
- 3. Have trainees practice configuring a sling to produce a single leg/single wrap choker hitch. This laboratory corresponds to part of Performance Task 3.
- 4. Have trainees practice configuring a sling to produce a single leg/double wrap choker hitch. This laboratory corresponds to Performance Task 4.

Session IV. Tag Lines; Laboratory

A. Tag Lines

B. Laboratory

Have trainees practice selecting the correct tag line for a specified load. This laboratory corresponds to Performance Task 5.

Session V. Rigging Safety; Guidelines for Unloading and Yarding Materials

A. Rigging Safety

- 1. Barricades
- 2. Rigging Precautions
- 3. Load Preparations and Handling

B. Guidelines for Unloading and Yarding Materials

- 1. Unloading
- 2. Using Slings

Session VI. Review and Testing

A. Module Review

B. Module Examination

- 1. Trainees must score 70% 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 Performing Testing requirements.
- 2. Record the testing results on Training Report Form 200, and submit the result to the Training Program Sponsor.

Module Overview

This module explains how to use load charts to calculate safe lifting capacities for self-erecting, luffing boom, and hammerhead tower cranes. It also covers parts of line and counterweight configurations.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum* and *Tower Crane Operator*, Modules 48101-10 through 48104-10.

Objectives

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

1. Define the concepts of center of gravity and leverage.
2. Define the importance of using a load/capacity chart for lifting operations.
3. Define the terms on a load/capacity chart to indicate tower height/boom angle (where applicable), load radius, parts of line, and boom (jib) length.
4. Calculate crane capacity using a load/capacity chart.
5. Identify the difference between hammerhead, luffing boom, and self-erecting tower crane load/capacity charts.
6. Describe different tower crane counterweight configurations.

Performance Tasks

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

1. Identify the boom angle, boom (jib) length, and load radius on a load/capacity chart for a luffing boom tower crane.
2. Identify the boom (jib) length and load radius on a load/capacity chart for a hammerhead tower crane.
3. Identify the tower height and load radius for a self-erecting tower crane on a load/capacity chart.
4. Determine parts of line and counterweight considerations in load/capacity chart information.
5. Calculate tower crane capacities using load/capacity charts.

Materials and Equipment List

Pencils and paper	Cement brick for leverage demonstration
Whiteboard/chalkboard	(optional)
Markers/chalk	Load charts for hammerhead, luffing boom, and
Tower Crane Operator PowerPoint® Presentation	self-erecting tower cranes
Slides (ISBN 0-13-213797-6)	Module Examination*
Multimedia projector and screen	Performance Profile Sheets*
Desktop or laptop computer	

* Located in the Test Booklet

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that all trainees are briefed on appropriate field safety procedures. If the training center does not have a tower crane on site, this module will require that the trainees visit one or more job-sites in order to identify crane components. Ensure that trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ASME Standard B30.3-2009, Construction Tower Cranes, 2009. New York, NY: American Society of Mechanical Engineers.

Crane Safety: A Guide to OSHA Compliance and Injury Prevention, 1999. Carl O. Morgan. Rockville, MD: ABS Group, Inc.

Rigging Handbook, 2007. Jerry A. Klinke. Stevensville, MI: ACRA Enterprises, Inc.

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 *Load Charts*. 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.

Topic	Planned Time
Session I. Introduction; Center of Gravity and Leverage	
A. Introduction	_____
B. Center of Gravity and Leverage	_____
Session II. Understanding Load/Capacity Charts; Laboratory	
A. Understanding Load/Capacity Charts	_____
1. Information Found on Load/Capacity Charts	_____
2. Crane Configuration	_____
3. Boom (Jib) Length, Boom Angle, and Load Radius	_____
4. Counterweight Configurations	_____
5. Parts of Line	_____
B. Laboratory	_____
Have trainees practice determining parts of line and counterweight considerations in load/capacity chart information. This laboratory corresponds to Performance Task 4.	
Session III. Hammerhead Tower Crane Load/Capacity Charts; Laboratory	
A. Hammerhead Tower Crane Load/Capacity Charts	_____
1. Hammerhead Tower Crane Capacity Example	_____
B. Laboratory	
1. Have trainees practice identifying the boom (jib) length and load radius on a load/capacity chart for a hammerhead tower crane. This laboratory corresponds to Performance Task 2.	_____
2. Have trainees practice calculating hammerhead tower crane capacities using load/capacity charts. This laboratory corresponds to part of Performance Task 5.	_____

Session IV. Luffing Boom Tower Crane Load/Capacity Charts; Laboratory

- A. Luffing Boom Tower Crane Load/Capacity Charts _____
 - 1. Luffing Boom Tower Crane Capacity Example _____
- B. Laboratory _____
 - 1. Have trainees practice identifying the boom angle, boom (jib) length, and load radius on a load/capacity chart for a luffing boom tower crane. This laboratory corresponds to Performance Task 1. _____
 - 2. Have trainees practice calculating luffing boom tower crane capacities using load/capacity charts. This laboratory corresponds to part of Performance Task 5. _____

Session V. Self-Erecting Tower Crane Load/Capacity Charts; Laboratory

- A. Self-Erecting Tower Crane Load/Capacity Charts _____
 - 1. Self-Erecting Tower Crane Capacity Example _____
- B. Laboratory _____
 - 1. Have trainees practice identifying the tower height and load radius for a self-erecting tower crane on a load/capacity chart. This laboratory corresponds to Performance Task 3. _____
 - 2. Have trainees practice calculating self-erecting tower crane capacities using load/capacity charts. This laboratory corresponds to part of Performance Task 5. _____

Session VI. Range Diagrams; Review and Testing

- A. Range Diagrams _____
- B. Module Review _____
- C. Module Examination _____
 - 1. Trainees must score 70% 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 Performing 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 fundamentals of the communication process. It also provides the trainees with the opportunity to practice verbal and nonverbal communication, including the use of radios and *ASME B30.3* hand signals.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum* and *Tower Crane Operator*, Modules 48101-10 through 48105-10.

Objectives

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

1. Communicate effectively at the job site with management, the crew, and the signal person.
2. Demonstrate the standard hand signals as specified in *ASME B30.3*.
3. Describe the signaling procedure used when multiple signal persons are required.
4. Identify the various methods of communication on the job.
5. Demonstrate communication procedures using a handheld radio.

Performance Tasks

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

1. Demonstrate the proper use of hand signals as specified by *ASME B30.3*.
2. Direct an operator to move and place a load using the appropriate hand signals.
3. Demonstrate communication procedures using a handheld radio.

Materials and Equipment List

Pencils and scratch paper	Electronic communications system (if available)
Whiteboard/chalkboard	Handheld radios
Markers/chalk	Appropriate personal protective equipment
Tower Crane Operator PowerPoint® Presentation Slides (ISBN 0-13-213797-6)	Access to a tower crane and experienced operator to demonstrate direction using hand signals
Multimedia projector and screen	Tower crane simulator (optional)
Desktop or laptop computer	Module Examination*
Copy of <i>ASME Standard B30.3, Construction Tower Cranes</i>	Performance Profile Sheets*
Coffee cup, blindfold, and common objects for communication demonstration (optional)	

* Located in the Test Booklet

Safety Considerations

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

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ASME Standard B30.3-2009, Construction Tower Cranes, 2009. New York, NY: American Society of Mechanical Engineers.

Crane Safety: A Guide to OSHA Compliance and Injury Prevention, 1999. Carl O. Morgan. Rockville, MD: ABS Group, Inc.

Rigging Handbook, 2007. Jerry A. Klinke. Stevensville, MI: ACRA Enterprises, Inc.

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 *Communications*. 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.

Topic	Planned Time
Session I. Introduction; Communication Process; Effective Communication	
A. Introduction	_____
B. Communication Process	_____
1. Sending the Message	_____
2. Receiving the Message	_____
3. Feedback	_____
C. Effective Communication	_____
1. Lack of Common Experience	_____
2. Verbal Communication Problems	_____
3. Environmental Factors	_____
Session II. Methods and Modes of Communication; Laboratory	
A. Methods and Modes of Communication	_____
1. Verbal Modes of Communication	_____
B. Laboratory	_____
Have trainees practice communication procedures using a handheld radio. This laboratory corresponds to Performance Task 3.	
Session III. Methods and Modes of Communication, Continued; Laboratory	
A. Methods and Modes of Communication	_____
1. Nonverbal Modes of Communication	_____
B. Laboratory	
1. Have trainees practice using the hand signals specified by <i>ASME B30.3</i> . This laboratory corresponds to Performance Task 1.	_____
2. Have trainees practice directing an operator to move and place a load using the appropriate hand signals. This laboratory corresponds to Performance Task 2.	_____

**Session IV. Multiple-Crane Lifting Operations; Multiple Signal Persons;
Review and Testing**

A. Multiple-Crane Lifting Operations

B. Multiple Signal Persons

C. Module Review

D. Module Examination

1. Trainees must score 70% 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.

E. 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 Performing 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 basic functions of a tower crane, as well as standard procedures for starting up and shutting down tower cranes. It also provides the trainee with the opportunity to become familiar with the actual operation of a tower crane and the functions of its controls.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum* and *Tower Crane Operator*, Modules 48101-09 through 48106-09.

Objectives

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

1. Perform a site evaluation.
2. Set up matting, outriggers, and barricades as required for the safe operation of a tower crane.
3. Perform pre-operation and post-operation inspections.
4. Interpret and follow hand signals and voice commands.
5. Use crane controls to smoothly maneuver a load.
6. Shut a tower crane down to ensure safety and security.

Performance Tasks

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

1. Survey a job site for potential hazards related to ground support.
2. Select and determine lift location.
3. Perform pre-operation and post-operation inspections.
4. Interpret and follow hand signals and voice commands.
5. Use tower crane controls to smoothly maneuver a load.
6. Safely shut down a tower crane.

Materials and Equipment List

Pencils and paper	Tower crane manufacturer's operating manual
Whiteboard/chalkboard	Electronic communications system or handheld radios
Markers/chalk	Appropriate personal protective equipment
Tower Crane Operator PowerPoint® Presentation Slides (ISBN 0-13213797-6)	Access to a tower crane
Multimedia projector and screen	Tower crane simulator (optional)
Desktop or laptop computer	Module Examination*
Copy of <i>ASME Standard B30.3, Construction Tower Cranes</i>	Performance Profile Sheets*
Copy of <i>OSHA Standard 29 CFR, Part 1926</i>	

* Located in the Test Booklet

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that all trainees are briefed on appropriate field safety procedures. If the training center does not have a tower crane on site, this module will require that the trainees visit one or more job-sites in order to demonstrate crane operation. Ensure that trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ASME Standard B30.3-2009, Construction Tower Cranes, 2009. New York, NY: American Society of Mechanical Engineers.

Crane Safety: A Guide to OSHA Compliance and Injury Prevention, 1999. Carl O. Morgan. Rockville, MD: ABS Group, Inc.

Rigging Handbook, 2007. Jerry A. Klinke. Stevensville, MI: ACRA Enterprises, Inc.

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 25 hours are suggested to cover *Operating a Tower Crane*. 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.

Topic	Planned Time
Session I. Introduction; Site Conditions and Setup Responsibilities; Site Analysis	
A. Introduction	_____
B. Site Conditions and Setup Responsibilities	_____
C. Site Analysis	_____
1. Site Evaluation	_____
Session II. Transit; Setup; Laboratory	
A. Transit	_____
B. Setup	
1. Assembly/Disassembly Clearance	_____
2. Lift Location	_____
3. Ground Conditions	_____
C. Laboratory	
1. Have trainees practice surveying a jobsite for potential hazards related to ground support. This laboratory corresponds to Performance Task 1.	_____
2. Have trainees practice selecting and determining a lift location. This laboratory corresponds to Performance Task 2.	_____
Session III. Pre-Operation Inspection; Laboratory	
A. Pre-Operation Inspection	_____
B. Laboratory	_____
Have trainees practice performing a pre-operation inspection. This laboratory corresponds to part of Performance Task 3.	
Session IV. Lifting Operations	
A. Lifting Operations	_____
1. Proximity to Other Equipment	_____
2. Public Protection	_____
3. On-Site Personnel	_____
4. Overhead Hazards	_____

Session V. Operator Aids

A. Operator Aids

1. Manufacturer's Operating Manual
2. Hand Signals
3. Upper and Lower Hoist-Limiting Devices
4. Selected Controls Lockout System
5. Boom Angle Sensor
6. Wind Velocity Indicator (Anemometer)

Session VI. Controls

A. Controls

Session VII and VIII. Practical Operations With and Without a Load; Laboratory

A. Practical Operations With and Without a Load

1. Operational Tests and Rated Load Tests
2. Handling the Load
3. Shutdown Guidelines

B. Laboratory

1. Have trainees practice interpreting and following hand signals and voice commands. This laboratory corresponds to Performance Task 4.
2. Have trainees practice using tower crane controls to smoothly maneuver a load. This laboratory corresponds to Performance Task 5.
3. Have trainees practice safely shutting down a tower crane. This laboratory corresponds to Performance Task 6.

Session IX. Post-Operation Inspection; Laboratory

A. Post-Operation Inspection

B. Laboratory

Have trainees practice performing a post-operation inspection. This laboratory corresponds to part of Performance Task 3.

Session X. Review and Testing

A. Module Review

B. Module Examination

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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 Performing Testing requirements.
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.