

Module Overview

This module introduces the trainee to calculations and methods for determining flotation device size, load and line pull for lifting, rigging sling capacities, and load distribution for each crane in a two-crane lift.

Objectives

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

1. Calculate the required size of cribbing or blocking for safe operation of lifting equipment.
2. Calculate the parts of line, maximum load, and line pull for lifting operations.
3. Calculate the lifting capacities of rigging slings for different lifting conditions.
4. Determine the load distribution for each crane in a two-crane lift.

Performance Tasks

This is a knowledge-based module; there are no performance tasks.

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Module Examinations*

* 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

Review safety guidelines associated with working on rigging to ensure correct lifting calculations.

Additional Resources

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

Bob's Rigging and Crane Handbook, Latest Edition. Leawood KS: Pellow Engineering Services.

IPT's Rigging and Crane Handbook, Latest Edition. Edmonton, Alberta, Canada: IPT Publishing and Training.

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 *Applied Trade Math*. 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; Factors Affecting Lifting Capacity; Rigging Equipment; Multiple-Crane Lifting	
A. Introduction	_____
B. Factors Affecting Lifting Capacity	_____
1. Soil Weight-Bearing Capability	_____
2. Load Dynamics	_____
3. Flotation	_____
4. Bearing Mats and Floats	_____
5. Center of Gravity	_____
C. Rigging Equipment	_____
1. Mechanical Advantage	_____
2. Line Parts	_____
3. Maximum Load	_____
4. Slings	_____
D. Multiple-Crane Lifting	_____
1. Two-Crane Lift	_____
2. Two-Crane Lift with an Equalizer Beam	_____
Session II. Review and Testing	
A. 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 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 introduces the trainee to flux-cored arc welding. The trainee will learn to make welds on carbon steel plate in multiple positions with and without shielding gases.

Objectives

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

1. Explain flux-cored arc welding (FCAW) safety.
2. Set up FCAW equipment with appropriate shielding gases and filler metals.
3. Identify and explain the use of FCAW equipment.
4. Identify and explain the use of FCAW shielding gases and filler materials.
5. Perform FCAW multiple-pass fillet welds on carbon steel plate coupons in multiple positions, using flux-cored wire and, if required, shielding gas.
6. Perform FCAW multiple-pass V-groove welds on carbon steel plate coupons in multiple positions (with or without backing), using flux-cored wire and, if required, shielding gas.
7. Identify and explain the function and application of dual shield welding.

Performance Tasks

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

1. Set up FCAW equipment with and without shielding gases.
2. Make multiple-pass FCAW fillet welds on carbon steel plate coupons in the following positions:
 - 1F
 - 2F
3. Make multiple-pass FCAW V-groove welds on carbon steel plate coupons in the following positions (with or without backing):
 - 1G
 - 2G

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Typical WPS

Wire feeder
Weld gun
Welding equipment
Shielding gases
Practice coupons
Filler materials
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. Review safety guidelines associated with working with flux-cored arc welding. Emphasize the importance of proper housekeeping.

Additional Resources

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

- AWS B1.10: 1999 Guide for the Nondestructive Examination of Welds.* Miami, FL: American Welding Society.
- AWS B1.11: 2000 Guide for the Visual Examination of Welds.* Miami, FL: American Welding Society.
- AWS C5.6-1989 Recommended Practices for Gas Metal Arc Welding.* Miami, FL: American Welding Society.
- Lincoln Electric website: www.lincolnelectric.com offers sources for products and training.
- Modern Welding Technology.* Howard B. Cary. Englewood Cliffs, NJ: Prentice Hall, Inc.
- OSHA 1910.269, Appendix C, Protection from Step and Touch Potentials.* Current Edition. Washington, DC: Occupational Safety and Health Administration (OSHA).
- OSHA 1926.351, Arc Welding and Cutting.* Current Edition. Washington, DC: Occupational Safety and Health Administration (OSHA).
- Welding Handbook, Volume 1 (2001) and Volume 2 (2004).* Miami, FL: American Welding Society.

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 *Flux Core for Ironworking*. 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; Safety Practices; Characteristics of Welding Current	
A. Introduction	_____
B. Safety Practices	_____
1. Protective Clothing and Equipment	_____
2. Fire/Explosion Prevention	_____
3. Work Area Ventilation	_____
C. Characteristics of Welding Current	_____
1. Voltage	_____
2. Amperage	_____
Session II. FCAW Equipment and Process; FCAW Filler Metals	
A. FCAW Equipment and Process	_____
1. FCAW Metal Transfer Process	_____
2. External Wire Feeders	_____
3. FCAW-G Guns	_____
4. FCAW-S Guns	_____
B. FCAW Filler Metals	_____
1. Carbon Steel Flux-Cored Electrodes	_____
2. Low-Alloy Steel Flux-Cored Electrodes	_____

C. Making Open V-Groove Welds

1. Groove Weld Positions
2. Acceptable and Unacceptable Groove Weld Profiles
3. Practicing Flat (1G) Position Open V-Groove Welds
4. Practicing Horizontal (2G) Position Open V-Groove Welds
5. Practicing Vertical (3G) Position Open Root V-Groove Welds
6. Practicing Overhead (4G) Position Open V-Groove Welds

Sessions VII–XV. Laboratories

A. Laboratory

1. Have trainees practice setting up welding equipment and area.
2. Have trainees practice flux-core welding.

B. PT/Laboratory

1. Have the trainees set up FCAW equipment with and without shielding gases. This laboratory corresponds to Performance Task 1.
2. Have the trainees make multiple-pass FCAW fillet welds on carbon steel plate coupons in the following positions:

- 1F
- 2F

This laboratory corresponds to Performance Task 2.

3. Have the trainees make multiple-pass FCAW V-groove welds on carbon steel plate coupons in the following positions (with or without backing):

- 1G
- 2G

This laboratory corresponds to Performance Task 3.

Session XVI. Review and Testing

A. 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 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 introduces the trainee to stud welding, its applications, equipment, and safety requirements. The trainee will also learn to set up a stud welding machine, adjust the gun, install studs, and test the welds.

Objectives

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

1. Identify safety precautions associated with stud welding, including hazards.
2. Recognize and identify the equipment associated with stud welding.
3. Describe stud welding equipment setup and acceptable stud welds with proper stud placement.
4. Explain testing of stud welding.

Performance Tasks

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

1. Set up the stud machine.
2. Adjust the stud gun for the size, type, and depth of studs.
3. Inspect a stud to make sure the stud has been properly installed.
4. Identify the parts of a stud welding gun.

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Stud welding machine

Welding cables
Stud welding gun
Ferrules
Selection of studs for practice welds
Hammer for bend testing
Examples of bad welds
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. Review safety guidelines associated with working with stud welding machines. Emphasize the importance of proper housekeeping.

Additional Resources

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

AWS D1.1, Structural Welding Code–Steel, Latest edition. Miami, FL: American Welding Society.
Principles and Practices of Stud Welding, Latest edition. Elyria, OH: Nelson Stud Welding, 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 *Stud Welding*. 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; Stud Welding Applications; Stud Welding Equipment; Stud Welding Safety	
A. Introduction	_____
B. Stud Welding Applications	_____
1. Composite Construction	_____
2. Concrete Anchors and Through-Deck Welding	_____
3. Precast/Tilt-Up Concrete	_____
4. Grating Installation	_____
C. Stud Welding Equipment	_____
1. DC Power Source	_____
2. Timing Control Unit	_____
3. Stud Welding Gun	_____
4. Power Cables for Stud Welding	_____
5. Studs	_____
6. Stud Chucks	_____
7. Ferrules and Ferrule Grips	_____
D. Stud Welding Safety	_____
Sessions II and III. Preparations for Stud Welding; Stud Welding Process; Inspection and Testing of Stud Welds	
A. Preparations for Stud Welding	_____
B. Stud Welding Process	_____
C. Inspection and Testing of Stud Welds	_____
1. Visual Inspection	_____
2. Stud Weld Bend Testing	_____
3. Stud Torque Test	_____
D. PT/Laboratory	
1. Have trainees set up the stud machine. This laboratory corresponds to Performance Task 1.	_____
2. Have trainees adjust the stud gun for the size, type, and depth of studs. This laboratory corresponds to Performance Task 2.	_____
3. Have trainees inspect stud to make sure the stud has been properly installed. This laboratory corresponds to Performance Task 3.	_____
4. Have trainees identify the parts of a stud welding gun. This laboratory corresponds to Performance Task 4.	_____

Session IV. Review and Testing

A. 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 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 introduces the trainee to the hazards and safety precautions associated with structural ironworking. It also prepares the trainee for assembling and erecting trusses and installing curtain walls.

Objectives

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

1. Explain how to identify unusual hazards associated with structural steel activities and the precautions associated with each.
2. Describe the assembly and erection of trusses.
3. Describe curtain wall installation practices.

Performance Tasks

This is a knowledge-based module. There are no performance tasks.

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Copies of *AISC 7.5*
Module Examinations*

* Single-module AIG purchases include the printed exam. 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. Review safety guidelines associated with working on structural steel and with avoiding unusual hazards. Emphasize the importance of proper housekeeping.

Additional Resources

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

AISC Code of Standard Practices for Steel Buildings and Bridges, Latest edition. Chicago, IL: American Institute of Steel Construction, Inc.

AISC Manual of Steel Construction Allowable Stress Design, Latest edition. Chicago, IL: American Institute of Steel Construction, 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 *Structural Ironworking Three*. 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; Identifying Unusual Hazards of the Ironworking Trade; Making Final Alignment Corrections	
A. Introduction	_____
B. Identifying Unusual Hazards of the Ironworking Trade	_____
1. Fires and Explosion	_____
2. Older Cranes	_____
3. Exposures	_____
C. Making Final Alignment Corrections	_____
1. Corrective Tolerances	_____
2. Alignment References	_____
Sessions II and III. Assembly and Erection of Trusses; Curtain Walls	
A. Assembly and Erection of Trusses	_____
1. Loading Concepts	_____
2. Truss Concepts	_____
3. Using Trusses Assembled Off Site	_____
4. Truss Delivery and Storage	_____
5. Assembling Trusses On Site	_____
6. Truss Rigging for Lifting	_____
7. Erecting Trusses (In General)	_____
8. Erecting Trusses	_____
B. Curtain Walls	_____
1. Curtain Wall Design	_____
2. Types of Curtain Wall Systems	_____
3. Curtain Wall Installation	_____
4. Curtain Wall Exterior Finish	_____
Session IV. Review and Testing	
A. 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.	

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.

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
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
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 at 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 trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use specialized rigging equipment, and may require them to visit construction sites and work around cranes. Brief trainees on site safety and crane procedures. Emphasize crane safety.

Additional Resources

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

Bob's Rigging and Crane Handbook, Latest Edition. Leawood KS: Pellow Engineering Services.

IPT's Crane and Rigging Handbook, Latest Edition. Edmonton, Alberta, Canada: IPT Publishing and Training.

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.

Topic	Planned Time
Sessions I and II. Introduction; Load Dynamics	
A. Introduction	_____
B. Load Dynamics	_____
1. Rotational Forces or Moments	_____
2. Crane Stability	_____
C. PT/Laboratory	_____
Have trainees practice determining the center of gravity for a non-symmetrical load. This laboratory corresponds to Performance Task 2.	
Session III. Special Equipment Used in Heavy Rigging	
A. Special Equipment Used in Heavy Rigging	_____
1. Cribbing	_____
2. Inclined Planes	_____
Sessions IV and V. Slings	
A. Slings	_____
1. Sling Tensions	_____
2. Bridle Hitches	_____
3. Basket Hitches	_____
4. Choker Hitches	_____
B. PT/Laboratory	_____
Have trainees practice selecting the proper sling(s) for a given lift. This laboratory corresponds to Performance Task 3.	
Sessions VI and VII. Using Beams; Rigging Rebar Bundles	
A. Using Beams	_____
1. Adjustable Beams	_____
2. Equalizer Beams	_____
B. PT/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 introduces the trainee to the methods and materials used in precast concrete and tilt-up construction. Trainees will learn about types of lifting inserts, rigging requirements, and methods of erecting and stabilizing panels.

Objectives

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

1. Describe structural and architectural precast concrete.
2. Plan for a tilt-up project.
3. Identify and explain lifting inserts.
4. Explain rigging requirements for precast and tilt-up erection.
5. Explain erecting, connecting, and bracing requirements for precast members and tilt-up wall panels.

Performance Tasks

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

1. Develop a JHA for precast erection.
2. Develop a JHA for tilt-up erection.

Materials and Equipment

Multimedia projector and screen

Ironworking Level Three

PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)

Computer

Whiteboard/chalkboard

Markers/chalk

Pencils and paper

Example of a JHA for precast erection

Example of a JHA for tilt-up erection

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. Review safety guidelines associated with working on precast and tilt-up construction projects. Include rigging safety guidelines and considerations. Emphasize the importance of proper housekeeping.

Additional Resources

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

Erector's Manual: Standards and Guidelines for the Erection of Precast Concrete Products. Chicago, IL: Precast/Prestressed Concrete Institute (PCI).

Erection Safety for Precast and Prestressed Concrete. Chicago, IL: Precast/Prestressed Concrete Institute (PCI).

The Tilt-up Construction and Engineering Manual. Mount Vernon, IA: Tilt-Up Concrete Association (TCA).

Tilt-up Concrete Construction Guide. Farmington Mills, MI: American Concrete Institute (ACI).

Precast Products Manual. Tampa, FL: Meadow Burke.

Tilt-up Manual. Tampa, FL: Meadow Burke.

Tilt-up Construction Products Handbook. Miamisburg, OH: Dayton Superior.

Precast Products Handbook. Miamisburg, OH: Dayton Superior.

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 12½ hours are suggested to cover *Precast/Tilt-Up Erection*. 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; Precast Concrete	
A. Introduction	_____
1. Architectural Treatments	_____
2. Industry Standards	_____
B. Precast Concrete	_____
1. Prestressed Concrete	_____
2. Post-Tensioned Concrete	_____
3. Connections	_____
4. Delivery and Storage of Precast Concrete	_____
5. Rigging and Erection of Precast Concrete	_____
6. Bracing	_____
Sessions II and III. Tilt-Up Construction	
A. Tilt-Up Construction	_____
1. How Tilt-Up Panels are Made	_____
2. The Panel Erection Process	_____
3. Rigging Requirements	_____
4. Bracing Requirements	_____
B. Laboratory	_____
Take the trainees to a job site where precast or tilt-up erection is taking place. Have them identify panels, components, rigging equipment, and potential hazards located at the scene. Have them observe a tilt-up panel or precast member being erected.	

Session IV. Job Hazard Analysis

A. Job Hazard Analysis _____

B. PT/Laboratory

1. Have trainees develop a JHA for precast erection. This laboratory corresponds to Performance Task 1. _____
2. Have trainees develop a JHA for tilt-up erection. This laboratory corresponds to Performance Task 2. _____

Session V. Review and Testing

A. 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 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 introduces the trainee to various special rigging devices, such as air tuggers, A-frames, and Chicago booms. The trainee will become familiar with hoisting devices and their uses, including derricks, HLDs, electric overhead trolleys, gantries, and jacking frames. The trainee will also learn to rig high lines.

Objectives

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

1. Explain crane safety hazards and precautions.
2. Describe and explain the uses of the following special rigging equipment:
 - Air tugger
 - Gin pole
 - Chicago boom
 - A-frame
 - Davit
 - Balancing beam
 - High lines
 - Hilman rollers
3. Identify and describe the following types of cranes and explain their uses:
 - Derricks
 - Gantries
 - HLDs
 - Electric overhead trolley cranes
 - Jacking frames

Performance Task

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

1. Rig high lines.

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer
Whiteboard/chalkboard

Markers/chalk
Pencils and paper
Access to an area suitable for rigging high lines
Rigging equipment
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. Review safety guidelines associated with working on cranes and around hoisting devices. Emphasize the importance of proper housekeeping.

Additional Resources

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

Bob's Rigging and Crane Handbook, Latest Edition. Leawood KS: Pellow Engineering Services.

IPT Rigging and Crane Handbook, Latest Edition. Edmonton, Alberta, Canada: IPT Publishing and Training.

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 *Special Application Hoisting Devices*. 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; Electric Overhead Traveling Cranes	
A. Introduction	_____
B. Electric Overhead Traveling Cranes	_____
1. EOT Classifications	_____
2. EOT Terminology	_____
3. EOT Crane Safety	_____
4. Lifting Tackle	_____
5. Heavy Lifting Devices	_____
Sessions II and III. Equipment for Special Applications	
A. Equipment for Special Applications	_____
1. Air Tugger	_____
2. Gin Pole	_____
3. Chicago Boom	_____
4. A-Frame	_____
5. Davit	_____
6. Jacking Frame	_____
7. Balancing Beam	_____
8. High Lines	_____
9. PT/Laboratory	_____
Have trainees rig high lines. This laboratory corresponds to Performance Task 1.	
10. Rolling Devices	_____
11. Derricks	_____

Session IV. Review and Testing

A. 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 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 introduces the trainee to setting up, using, and caring for survey equipment, with a focus on total stations. Determining control points and turning horizontal angles are also explained.

Objectives

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

1. Set up a theodolite over a point and backsight to another point.
2. Sweep a column for plumb with a theodolite.
3. Set up additional reference points by turning 90-degree angles.
4. Describe the process in lining up precast and tilt-up panels using multiple instruments.
5. Describe the terminology used for total stations.
6. Describe how to identify control points.
7. Describe the proper application of a prism and how to properly hold a surveying rod.

Performance Tasks

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

1. Set up a theodolite over a point and backsight to another point.
2. Sweep a column for plumb with a theodolite.
3. Set up additional reference points by turning 90-degree angles.
4. Demonstrate how to properly hold a prism and surveying rod.

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Total station

Total station display unit
Tripod for total station
Prism assembly
Survey rod
Theodolite
Access to a suitable area for surveying
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. Review safety guidelines associated with working on survey equipment, including working near traffic. Emphasize the importance of proper housekeeping.

Additional Resources

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

- Construction Surveying and Layout: A Step-by-Step Engineering Methods Manual*, 2002. Wesley G. Crawford. West Lafayette, IN: Creative Construction Publishing.
- Principles and Practices of Commercial Construction*, 2008. Cameron K. Andres and Ronald C. Smith. Upper Saddle River, NJ: Prentice Hall.
- Surveying Principles and Applications*, 2008. Barry F. Kavanagh. Upper Saddle River, NJ: Prentice Hall.
- Surveying With Construction Applications*, 2009. Barry F. Kavanagh. Upper Saddle River, NJ: Prentice Hall.

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 *Survey Equipment Use and Care Two*. 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
Sessions I and II. Introduction; Total Stations; Prisms, Reflective Targets, and Survey Rods; Basic Setup of a Total Station; Control Points; Basic Horizontal and Vertical Angle Measurements, Part One	
A. Introduction	_____
B. Total Stations	_____
C. Prisms, Reflective Targets, and Survey Rods	_____
D. Basic Setup of a Total Station	_____
1. Total Station Controls	_____
2. Total Station Initial Setup, Centering, and Initialization	_____
E. Control Points	_____
1. Primary Horizontal Control Points	_____
2. Secondary Horizontal Control Points	_____
3. Building Layout or Working Horizontal Control Points	_____
F. Basic Horizontal and Vertical Angle Measurements	_____
1. Laying Out Building Foundation Lines	_____
Session III. Basic Horizontal and Vertical Angle Measurements, Part Two; Basic Turning of Horizontal Angles and Object Plumb Procedures; Laying Out Anchor Bolts for Steel Columns	
A. Basic Horizontal and Vertical Angle Measurements	_____
1. Measuring Horizontal Angles	_____
2. Measuring Vertical Angles	_____
3. Common Mistakes Made When Making Angular Measurements	_____
B. Basic Turning of Horizontal Angles and Object Plumb Procedures	_____
1. Turning 90-Degree Angles	_____
2. Checking Column and Panel Plumb	_____
C. Laying Out Anchor Bolts for Steel Columns	_____

Sessions IV and V. PT/Laboratory

A. PT/Laboratory

1. Have trainees set up a theodolite over a point and backsight to another point. _____
This laboratory corresponds to Performance Task 1.
2. Have trainees sweep a column for plumb with a theodolite. This laboratory _____
corresponds to Performance Task 2.
3. Have trainees set up additional reference points by turning 90-degree angles. _____
This laboratory corresponds to Performance Task 3.
4. Have trainees demonstrate how to properly hold a prism and surveying rod. _____
This laboratory corresponds to Performance Task 4.

Session VI. Review and Testing

A. 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 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 introduces the trainee to the materials and procedures involved in the erection of pre-engineered steel buildings and to the special safety precautions necessary when performing such work.

Objectives

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

1. Explain special safety precautions pertaining to the erection of pre-engineered steel buildings.
2. Describe the work procedures associated with the erection of pre-engineered steel buildings, from the preliminary activities to the actual erection.
3. Identify the structural materials used in pre-engineered buildings.

Performance Tasks

This is a knowledge-based module. There are no performance tasks.

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Samples of A-307, A-325, and A-490 bolts
Module Examinations*

* 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. Review safety guidelines associated with working on pre-engineered systems and the dangers involved in erecting them. Emphasize the importance of proper housekeeping.

Additional Resources

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

www.vp.com is the website home for Varco Pruden and describes some of the options and materials available.

www.engineeringcivil.com is the website section of Civil Engineering Portal that discusses pre-engineered buildings in some detail.

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 *Pre-Engineered Systems*. 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; Special Safety Precautions; Structure; Preliminary Work Processes; Erection Processes	
A. Introduction	_____
B. Special Safety Precautions	_____
1. Hand Tool Safety	_____
2. Handling Safety	_____
3. Roof Safety	_____
C. Structure	_____
D. Preliminary Work Processes	_____
E. Erection Processes	_____
1. Secondary Framing and Bracing	_____
2. Sheathing	_____
3. Accessories	_____
4. Trim	_____
5. Fitting	_____
6. Bolting	_____
7. Welding	_____
Session II. Materials; Tools; Siding; Roofing; Insulation; Accessories; Review and Testing	
A. Materials	_____
1. Steel Pipe and Structural Tubing	_____
2. Bolted Connections	_____
3. Panel Fasteners	_____
4. Washers and Sealants	_____
B. Tools	_____
C. Siding	_____
1. Materials	_____
2. Sidewall Installation	_____
D. Roofing	_____
1. Materials	_____
2. Installation	_____
E. Insulation	_____
1. Materials	_____
2. Wall Insulation	_____
3. Roof Insulation	_____
F. Accessories	_____
G. Review	_____
H. 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 introduces the trainee to ornamental ironworking, including the types of metal and their applications, installation, and finishes. Trainees will learn to set up a core drill and install fasteners and grout.

Objectives

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

1. Identify and explain the types of metals used in miscellaneous/ornamental ironworking.
2. Identify and explain the different types of miscellaneous/ornamental ironworking applications and components.
3. Explain how to install miscellaneous/ornamental ironworking components to specified tolerances.
4. Explain how to finish selected metals used for miscellaneous/ornamental ironworking.
5. Explain proper installation of appropriate anchors and fasteners.
6. Explain how to properly set up a core drill and how to grout.

Performance Tasks

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

1. Identify different types of metals used for ornamental ironworking.
2. Identify different types of ornamental ironworking components.
3. Identify different types of metal finishes and coatings.
4. Identify miscellaneous anchors, including epoxy and stud bolts, and describe how they are installed.

Materials and Equipment

Multimedia projector and screen

Ironworking Level Three

PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)

Computer

Whiteboard/chalkboard

Markers/chalk

Pencils and paper

Samples of different ornamental ironworking metals

Pictures of ornamental ironworking components

A selection of anchors

Metal samples with different types of finishes and coatings

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. Review safety guidelines associated with working on ornamental ironwork. This may involve working at heights, welding, and rigging heavy loads. Emphasize the importance of proper housekeeping.

Additional Resources

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

Metal Finishes Manual for Architectural and Metal Products, Current Edition. Chicago, IL: Architectural Metal Products (AMP) Division of The National Association of Architectural Metal Manufacturers (NAAMM).

Metal Stairs Manual, AMP 510, Current Edition. Chicago, IL: Architectural Metal Products (AMP) Division of The National Association of Architectural Metal Manufacturers (NAAMM).

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 *Miscellaneous/Ornamental Ironworking*. 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; Types of Ornamental Metals; Ornamental Ironworking Applications and Components; Installing Stairs; Railing Systems; Ladders, Part One	
A. Introduction	_____
B. Types of Ornamental Metals	_____
1. Steel	_____
2. Aluminum	_____
3. Copper	_____
4. Brass	_____
5. Stainless Steel	_____
6. Weathering (Cor-Ten®) Steel	_____
C. PT/Laboratory	_____
Have the trainees identify different types of metals used for ornamental ironworking. This laboratory corresponds to Performance Task 1.	
D. Ornamental Ironworking Applications and Components	_____
1. Applications	_____
E. Installing Stairs	_____
1. Terminology	_____
2. Advantages of Steel	_____
3. Classifications of Stairs	_____
F. Railing Systems	_____
1. Railing Design and Codes	_____
2. Railing Materials	_____
3. Railing Fabrication from Pipe and Tubing	_____
4. Railing Installation and Anchorage for Pipe and Tubing	_____
5. Angle Railings	_____
G. Ladders	_____
1. Ladder Dimensions and Clearances	_____
2. Ladder Fabrication	_____
3. Ornamental Railings and Guards	_____
H. PT/Laboratory	_____
Have the trainees identify different types of ornamental ironworking components. This laboratory corresponds to Performance Task 2.	

Session II. Ladders, Part Two; Mechanical Anchors; Installation Basics for Ornamental Ironworking; Finishes for Selected Ornamental Ironworking Metals; Review and Testing

- A. Ladders, Part Two
 - 1. Codes and Guidelines _____
 - 2. Components _____
- B. Mechanical Anchors
 - 1. One-Step Anchors _____
 - 2. Bolt Anchors _____
 - 3. Screw Anchors _____
 - 4. PT/Laboratory _____
Have the trainees identify miscellaneous anchors, including epoxy and stud bolts, and describe how they are installed. This laboratory corresponds to Performance Task 4.
 - 5. Core Drill _____
 - 6. Vertical Components _____
- C. Installation Basics for Ornamental Ironworking
 - 1. Preparations _____
 - 2. Installation Activities _____
 - 3. Post-Installation Inspections _____
- D. Finishes for Selected Ornamental Ironworking Metals
 - 1. Types of Mechanical Finishes _____
 - 2. Types of Chemical Finishes _____
 - 3. Types of Applied Coatings _____
 - 4. PT/Laboratory _____
Have the trainees identify different types of metal finishes and coatings. This laboratory corresponds to Performance Task 3.
- E. 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.
- G. 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

Floors, stair landings, and stair stringers, among other things, use grating and checkered plate. The process of working either of these materials involves both different technologies and different skills than those applied elsewhere in ironworking. This module describes those materials and technologies.

Objectives

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

1. Describe the installation and attachment methods of grating and checkered plate.
2. Describe the types and applications of grating and checkered plate.
3. Explain how to properly rig grating and checkered plate.

Performance Task

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

1. Demonstrate the proper rigging application of grating and checkered plate.

Materials and Equipment

Multimedia projector and screen

Ironworking Level Three

PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)

Computer

Whiteboard/chalkboard

Markers/chalk

Pencils and paper

Rigging equipment

Samples of grating and checkered plate

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 the special safety precautions associated with grating and checkered plate. Ensure that trainees are briefed on the proper site or shop safety procedures.

Additional Resources

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

www.naamm.org

MBG 531, Current edition. Chicago, IL: Metal Bar and Grating (MBG) Division of the National Association of Architectural Metal Manufacturers (NAAMM).

www.mcnichols.com

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 *Grating and Checkered Plate*. 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; Grating, Part One	
A. Introduction	_____
B. Grating	_____
1. Grating Basics	_____
2. Grating Markings	_____
3. Grating Cuts and Variations	_____
4. Grating Additions	_____
5. Grating Anchors	_____
Session II. Grating, Part Two; Review and Testing	
A. Grating	_____
1. Checkered Plate	_____
2. Installing Grating and Plate	_____
3. Installation	_____
B. PT/Laboratory	_____
Have trainees demonstrate the proper rigging application of grating and checkered plate. This laboratory corresponds to Performance Task 1.	
C. Module Review	_____
D. 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.	
E. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the 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 describes air carbon arc cutting (CAC-A) equipment, safe work area preparation, CAC-A methods for cutting and cleaning defective metals, CAC-A methods for gouging and preparing base metals, and proper storage and housekeeping of CAC-A equipment.

Objectives

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

1. Identify and explain the air carbon arc cutting (CAC-A) process and equipment.
2. Select and install CAC-A electrodes.
3. Prepare the work area and CAC-A equipment for safe operation.
4. Use CAC-A equipment for washing and gouging activities.
5. Perform storage and housekeeping activities for CAC-A equipment.
6. Make minor repairs to CAC-A equipment.

Performance Tasks

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

1. Select and install CAC-A electrodes.
2. Prepare the work area and CAC-A equipment for safe operation.
3. Use CAC-A equipment for washing.
4. Use CAC-A equipment for gouging.
5. Perform storage and housekeeping activities for CAC-A equipment.

Materials and Equipment

Markers/chalk

Whiteboard/chalkboard

Ironworking Level Three

PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)

Multimedia projector and screen

Computer

Pencils and paper

Appropriate personal protective equipment

Leather protective gear (jacket or sleeves)

Various welding gloves

Samples of protective welding footwear

Welding shield or helmet with
appropriate lenses

Earplugs

Safety glasses with approved lenses

Full face shields

Respirator

Soapstone

Tape measure

Pliers

Wire brush

Chipping hammer

CAC-A unit with cutting torch and appropriate
gas sources

Scrap steel shapes containing bolts, rivets,
protruding welds, eyes, clips, and other
protrusions to be washed

DC welding machine, minimum 200 amps for
light duty, or 600 amps for medium duty

Air carbon arc torch and cable

Selection of carbon electrodes up to 3/8"

Compressed air source, minimum of 16 cfm
at 80 psig for light and medium duty, or
minimum of 50 cfm at 100 psig for heavy duty

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 the special safety precautions associated with welding because of the added potential for fire, burns, respiratory problems, and electrical shock. Ensure that trainees are briefed on shop safety procedures.

Additional Resources

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

ANSI C5.3, Recommended Practices for Air Carbon Arc Gouging and Cutting, Latest Edition. Miami, FL: American Welding Society.

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 12½ hours are suggested to cover *Air Carbon Arc Cutting and Gouging*. 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.

Topic	Planned Time
Session I. Introduction; Air Carbon Arc Cutting (CAC-A) Process and Equipment	
A. Introduction	_____
B. CAC-A Process	_____
C. CAC-A Equipment	_____
Session II. Selection and Installation of CAC-A Electrodes	
A. CAC-A Electrodes	_____
B. Electrode Selection	_____
C. Electrode Installation	_____
D. PT/Laboratory	_____
1. Have trainees practice selecting and installing electrodes. This laboratory corresponds to Performance Task 1.	
Session III. Preparing Work Area and CAC-A Equipment	
A. Preparing Work Area for CAC-A	_____
B. Setting Up CAC-A Equipment	_____
C. Test Operating CAC-A Equipment	_____
D. PT/Laboratory	_____
1. Have trainees practice setting up the work area and the CAC-A equipment. This laboratory corresponds to Performance Task 2.	
Session IV. Washing and Gouging with CAC-A Equipment	
A. CAC-A Planning	_____
B. CAC-A Washing	_____
C. PT/Laboratory	_____
1. Have trainees practice CAC-A washing. This laboratory corresponds to Performance Task 3.	
D. CAC-A Gouging	_____
E. PT/Laboratory	_____
1. Have trainees practice CAC-A gouging. This laboratory corresponds to Performance Task 4.	

Session V. Proper CAC-A Equipment Storage and Repair; Review and Testing

A. Proper Storage of CAC-A Equipment

B. Repair of CAC-A Equipment

C. PT/Laboratory

1. Have trainees practice storage and housekeeping activities on CAC-A equipment. This laboratory corresponds to Performance Task 5.

D. Module Review

E. 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.

F. Performance Testing

1. Trainees must complete each task to the satisfaction of the instructor to receive recognition from the 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 introduces the trainee to demolition work, including safety practices, recognizing hazardous materials, and specific demolition skills. The trainee will also become familiar with demolition tools for removing rivets.

Objectives

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

1. Apply specific safety precautions to demolition work including engineered procedures.
2. Identify potentially hazardous materials including lead, asbestos, and treated lumber.
3. Explain specified demolition skills:
 - Removing existing structural members for scrap
 - Removing existing structural members for reinstallation
 - Removing existing structural steel columns
 - Removing existing concrete-reinforced steel and precast columns
4. Explain the process of demolition tools to remove rivets:
 - Using oxyacetylene equipment
 - Using a rivet buster
 - Arc gouging
 - Demolition saw

Performance Tasks

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

1. Wash welds.
2. Wash the head of a bolt (to simulate cutting head off a rivet).
3. Properly use a demolition saw.

Materials and Equipment

Multimedia projector and screen
Ironworking Level Three
PowerPoint® Presentation Slides
(ISBN 978-0-13-266261-1)
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and paper

Oxyfuel torches
CAC-A torches
Demolition saws
Material with rivets
Material to cut
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. Review safety guidelines associated with working on demolition projects and around hazardous materials. Emphasize the importance of proper housekeeping.

Additional Resources

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

IPT's Rigging and Crane Handbook, Latest edition. Edmonton, Alberta, Canada: IPT Publishing and Training.

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 *Demolition*. 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; Safety; Demolition Preparation	
A. Introduction	_____
B. Safety	_____
1. Debris Accumulation	_____
2. Scaffold Safety	_____
3. Basic Rigging Precautions	_____
4. Welding and Burning Safety	_____
5. Environmental Hazards	_____
C. Demolition Preparation	_____
1. Identify Hazardous Materials	_____
2. Remove and Dispose of Hazardous Materials	_____
3. Develop a Plan to Handle Special Materials	_____
4. Recycle Demolition Debris	_____
5. Demolish the Structure	_____
6. Handle Remaining Debris	_____
Sessions II and III. Demolition; Demolition Skills	
A. Demolition	_____
1. Vertical-Drop Balling	_____
2. Swinging the Ball in Line with the Boom	_____
3. Swinging the Ball by Slewing	_____
B. Demolition Skills	_____
1. Tools and Equipment	_____
2. Removing Existing Beams	_____
C. PT/Laboratory	
1. Have the trainees wash welds. This laboratory corresponds to Performance Task 1.	_____
2. Have the trainees wash the head of a bolt (to simulate cutting head off a rivet). This laboratory corresponds to Performance Task 2.	_____
3. Have the trainees properly use a demolition saw. This laboratory corresponds to Performance Task 3.	_____

Session IV. Review and Testing

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

