Module Overview

This module presents the historical development of the ironworking trade. It explains personal qualities that contribute to successful employment. It also describes the organization and purpose of apprenticeship training, and the safety obligations of the employer and employee.

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 the personal qualities that contribute to successful employment.
2. Describe the historical development of the trade.
3. Identify the organization and purpose of apprenticeship training.
4. Identify employer and employee safety obligations.

Performance Tasks

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

Materials and Equipment

Multimedia projector and screen
Ironworking Level One
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copies of the Quick Quiz*
Module Examinations**

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

Additional Resources

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

Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover *Introduction to the Trade*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<td><strong>Session I. Introduction; Opportunities; Your Training Program; Responsibilities</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Ironworking Trade</td>
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<td>1. History of Structural Steel Building Materials</td>
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<td>C. Opportunities in the Construction Industry</td>
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<tr>
<td>D. Your Training Program</td>
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<tr>
<td>1. Standardized Training by NCCER</td>
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<td>2. Apprenticeship Program</td>
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<td>E. Responsibilities of the Employee</td>
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<td>1. Professionalism</td>
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<td>2. Honesty</td>
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<td>3. Loyalty</td>
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<td>4. Willingness to Learn</td>
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<td>5. Willingness to Take Responsibility</td>
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<td>6. Willingness to Cooperate</td>
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<td>7. Rules and Regulations</td>
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<td>8. Tardiness and Absenteeism</td>
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<tr>
<td><strong>Session II. Human Relations; Safety Obligations; Review; Module Exam</strong></td>
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<tr>
<td>A. Human Relations</td>
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<td>1. Making Human Relations Work</td>
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<td>2. Human Relations and Productivity</td>
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<td>3. Attitude</td>
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<td>4. Maintaining a Positive Attitude</td>
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<tr>
<td>B. Employer and Employee Safety Obligations</td>
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<tr>
<td>C. Module Review</td>
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<tr>
<td>D. Module Examination</td>
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</tr>
<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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</tbody>
</table>
Module Overview

This module covers safety procedures used in the ironwork trade. The use and care of mobile equipment, such as forklifts and generators, is also covered.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Module 30101-11.

Objectives

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

1. Describe the consequences of on-the-job accidents.
2. Explain the special responsibilities of OSHA.
3. List potential hazards for ironworkers.
4. Describe safe work practices when near cranes.
5. List major health hazards classified by OSHA.
6. Identify and explain the safe operation of various pieces of light equipment, including:
   - Aerial lifts
   - Generators
   - Compressors
   - Forklifts

Performance Tasks

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

1. Position and use an aerial work platform.
2. Demonstrate the proper use of a fall protection system.
3. Identify points of inspection on specified pieces of equipment.

Materials and Equipment

<table>
<thead>
<tr>
<th>Multimedia projector and screen</th>
<th>Photos of high work</th>
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</thead>
<tbody>
<tr>
<td>Ironworking Level One PowerPoint® Presentation Slides</td>
<td>U.S. Department of Transportation Hazardous Materials Regulations Manual</td>
</tr>
<tr>
<td>(ISBN 978-0-13-213795-9)</td>
<td>Equipment such as aerial lifts, generators, compressors, and forklifts</td>
</tr>
<tr>
<td>Computer</td>
<td>Copies of the Quick Quiz*</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Module Examinations**</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Performance Profile Sheets**</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td></td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td></td>
</tr>
</tbody>
</table>

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

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use various pieces of light equipment. Review general precautions needed when operating light equipment.

Additional Resources

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

The complete OSHA Safety and Health Regulations for Construction are located at www.osha.gov.

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 Trade Safety. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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</thead>
<tbody>
<tr>
<td>Session I. Introduction; On-the-Job Accidents; OSHA</td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. On-the Job Accidents</td>
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<tr>
<td>1. Examples of Hazardous Conditions</td>
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<tr>
<td>2. Ironworking Accident Statistics</td>
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<tr>
<td>3. Causes of Construction Accidents</td>
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<tr>
<td>C. OSHA</td>
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<td>1. Fall Protection</td>
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<td>2. Controlled Decking Zones</td>
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<tr>
<td>3. Opening Covers</td>
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<td>4. OSHA-Required Training</td>
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<tr>
<td>Session II. Developing Safety Awareness; Job Site Safety</td>
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</tr>
<tr>
<td>A. Developing Safety Awareness</td>
<td></td>
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<tr>
<td>1. Maintain a Safety Conscious Attitude</td>
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<tr>
<td>2. Dress Safely for the Job</td>
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<tr>
<td>3. Ventilation Needs and Respiratory Devices</td>
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<tr>
<td>4. Tool Safety</td>
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<td>5. Report Damaged Equipment</td>
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<tr>
<td>6. Welding Safety</td>
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<tr>
<td>B. Job Site Safety</td>
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<tr>
<td>1. Cranes</td>
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<tr>
<td>2. Material Handling and Storage</td>
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<tr>
<td>Session III. Light Equipment; Aerial Lifts</td>
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<tr>
<td>A. Light Equipment</td>
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<tr>
<td>1. Transporting Equipment</td>
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<tr>
<td>2. Hydraulic Systems</td>
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<td>3. Fueling Safety</td>
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<td>4. Battery Safety</td>
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</tbody>
</table>
B. Aerial Lifts
   1. Aerial Lift Assemblies
   2. Aerial Lift Operator Qualifications
   3. Typical Aerial Lift Controls
   4. Aerial Lift Safety Precautions
   5. Aerial Lift Operating Procedure
   6. Aerial Lift Operator’s Maintenance Responsibility
   7. Scissor Lifts
   8. Boom Lifts

C. Laboratory
   Have trainees position and use an aerial work platform. This laboratory
   corresponds with Performance Task 1.

Session IV. Generators; Air Compressors; Forklifts; Fall Protection Equipment
A. Generators
   1. Generator Assemblies
   2. Typical Generator Controls
   3. Generator Safety Precautions
   4. Generator Operating Procedure
   5. Generator Operator’s Maintenance Responsibility

B. Air Compressors
   1. Compressor Assemblies
   2. Typical Compressor Controls
   3. Compressor Safety Precautions
   4. Compressor Operating Procedure
   5. Air Compressor Operator’s Maintenance Responsibility

C. Forklifts
   1. Forklift Assemblies
   2. Forklift Operator Qualifications
   3. Typical Forklift Controls
   4. Forklift Safety Precautions
   5. Forklift Operation
   6. Forklift Operator’s Maintenance Responsibility

D. Laboratory
   Have trainees identify the points of inspection for specified pieces of equipment.
   This laboratory corresponds with Performance Task 3.

E. Fall Protection Equipment
   1. Standards for Fall Protection Equipment
   2. Personal Fall Arrest Systems
   3. Using Personal Fall Arrest Systems
   4. Safety Net Systems
   5. Rescue After a Fall

F. Laboratory
   Have trainees demonstrate the proper use of a fall protection system. This
   laboratory corresponds with Performance Task 2.
Session V. 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 describes the power and hand tools used in ironworking. The use, care, and maintenance of these tools are covered, as well as specific safety considerations.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 and 30102-11.

Objectives

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

1. Identify and explain commonly used safety tools and equipment.
2. Identify and describe the proper use of common ironworking hand tools.
3. Identify the power sources for common ironworking tools.
4. Identify and describe the proper use of common ironworking power tools.

Performance Tasks

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

1. Demonstrate the proper use of appropriate personal protective equipment.
2. Demonstrate the safe and effective use of available ironworking hand tools.
3. Demonstrate the safe and effective application of available power sources for ironworking power tools.
4. Demonstrate the safe and effective use of available ironworking power tools.

Materials and Equipment

Multimedia projector and screen

Ironworking Level One

PowerPoint® Presentation Slides

Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment, including the following:
- Face shields
- Protective leather
- Welding gloves
- Welding shields
- Fall protection devices
As available, examples of the following tools and equipment:
- Marking and measuring devices
- Clamps
- Wrenches
- Cleaning tools
- Threading tools
- Pliers
- Snips and shears
- Alignment tools
- Welding tools
- Rivet buster
- Air hammer
- Side grinder
- Impact wrench
- Reciprocating saw
- Powder-actuated tools
- Appropriate power sources
- Iron plate
- Selection of reciprocating saw blades
- Copies of the Quick Quiz*
- Module Examinations**
- Performance Profile Sheets**

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

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize the special safety precautions associated with each tool. 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.

Bolt Depot, Inc. provides charts and tables of information on fasteners and bolts.

Concrete Fastening Systems provides information on concrete anchors and fasteners.

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 Tools and Equipment of the Trade.

You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

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<thead>
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<th>Topic</th>
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<tr>
<td>A. Introduction</td>
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<td>B. PPE Safety Summary</td>
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<tr>
<td>1. Protective Equipment</td>
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<td>2. Fall Protection Equipment</td>
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<tr>
<td>3. Laboratory</td>
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<tr>
<td>Have trainees demonstrate the proper use of appropriate PPE. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td><strong>Session II. Hand Tools</strong></td>
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<td>B. Clamping Equipment</td>
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<td>C. Wrenches</td>
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<td>D. Cleaning Tools</td>
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<td>E. Cutting Tools</td>
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<td>F. Threading Tools</td>
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<td>G. Alignment Tools</td>
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<td>H. Belts and Bags</td>
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<td>I. Welding Tools</td>
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<tr>
<td>J. Laboratory</td>
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<tr>
<td>Have trainees practice the correct use of ironworking hand tools. This laboratory corresponds to Performance Task 2.</td>
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</tbody>
</table>
Session III. Power Sources; Power Tools

A. Power Sources
   1. Laboratory
      Have trainees demonstrate the application of available power sources for ironworking power tools. This laboratory corresponds to Performance Task 3.

B. Power Tools
   1. Rivet Buster and Air Hammer
   2. Side Grinder
   3. Impact Wrenches
   4. Powder-Actuated Tools
   5. Reciprocating Saw

Session IV. Power Tool Safety; Review and Testing

A. Power Tool Safety
   1. Laboratory
      Have trainees practice the correct use of various hand power tools. This laboratory corresponds to Performance Task 4.

B. Review

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

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

This module describes fastening systems used in ironworking. Types, tools, and installation procedures are covered.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30103-11.

Objectives

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

1. Recognize and identify A-325 and A-490 bolts, washers, and nuts by their identifying markings.
2. Identify the four common methods of correctly tensioning bolts.
3. Describe how to use the tension control, calibrated wrench, and turn-of-nut methods of tightening high-strength bolts.

Performance Tasks

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

1. Identify selected high-strength bolts.
2. Demonstrate the turn-of-nut method.
3. Demonstrate calibrated wrench tightening.
4. Demonstrate the proper use of a tension control gun.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Various A-325 and A-490 bolts, nuts, and washers
- Tension control guns
- Calibrated wrenches
- Ratchets and sockets
- Copies of the Quick Quiz*
- Module Examinations**
- Performance Profile Sheets**

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

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. 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.

Concrete Fastening Systems provides information on concrete anchors and fasteners. www.confast.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 2 1/2 hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover Fastening. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Methods for Tensioning Bolts; Threaded Fasteners; Bolting Up Structural Steel; Load-Indicating Washer; Skidmore</strong></td>
<td></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Methods for Tensioning Bolts</td>
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<tr>
<td>C. Threaded Fasteners</td>
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<tr>
<td>1. Thread Standards</td>
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<tr>
<td>2. A-325 Bolts</td>
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<td>3. A-490 Bolts</td>
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<td>4. Determining Bolt Length</td>
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<td>5. Bevel Washers</td>
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<td>6. Care of Bolts</td>
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<tr>
<td>7. Laboratory</td>
<td>Have the trainees identify selected high-strength bolts. This laboratory corresponds with Performance Task 1.</td>
</tr>
<tr>
<td>D. Bolting Up Structural Steel</td>
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<tr>
<td>1. Tension Control Bolts</td>
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<td>2. Calibrated Wrench Tightening</td>
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<tr>
<td>3. Turn-of-Nut Method</td>
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<tr>
<td>E. Load-Indicating Washer</td>
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<tr>
<td>F. Skidmore Calibrator</td>
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</tbody>
</table>

| **Session II. Laboratory; Review and Testing** |
| A. Laboratory | |
| 1. Have trainees demonstrate the turn-of-nut method. This laboratory corresponds to Performance Task 2. | |
| 2. Have trainees demonstrate calibrated wrench tightening. This laboratory corresponds to Performance Task 3. | |
| 3. Have trainees demonstrate the proper use of a tension control gun. This laboratory corresponds to Performance Task 4. | |
| B. Review | |
| C. Module Examination | |
| 1. Trainees must score 70 percent or higher to receive recognition from NCCER. | |
| 2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor. | |
| D. Performance Testing | |
| 1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements. | |
| 2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor. | |
Module Overview

This module introduces the trainee to manual and powered lifting devices, both mobile and stationary, used by ironworkers. Construction cranes are the most commonly used lifting device.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30104-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:
1. Identify and describe common lifting equipment.
2. Identify and explain commonly used construction cranes.
3. Identify and explain crane manuals, recordkeeping, and safety.
4. Describe the activities involved in assembling construction cranes.
5. Identify and use the correct hand signals to guide a crane operator.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:
1. Use common lifting equipment.
2. Use crane manuals, perform recordkeeping, and describe crane safety.
3. Use and interpret hand signals.

Materials and Equipment

<table>
<thead>
<tr>
<th>Multimedia projector and screen</th>
<th>Horn or other audible signaling device</th>
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</thead>
<tbody>
<tr>
<td>Ironworking Level One PowerPoint® Presentation Slides</td>
<td>Selection of manufacturers’ crane manuals and handbooks</td>
</tr>
<tr>
<td>Computer</td>
<td>A number of blank pages from recordkeeping books</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Construction crane for disassembly and assembly</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Portable radios (walkie-talkies)</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td>Copies of the Quick Quiz*</td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td>Module Examinations**</td>
</tr>
<tr>
<td>Crane capacity chart</td>
<td>Performance Profile Sheets**</td>
</tr>
<tr>
<td>Range diagram and capacity chart</td>
<td>* Located in the back of this module.</td>
</tr>
</tbody>
</table>

* | **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 and around mobile cranes and using lifting 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.


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 *Mobile Construction Cranes.* You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Lifting Equipment</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Lifting Equipment</td>
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<tr>
<td>1. Derricks</td>
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<td>2. Cranes</td>
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<td>3. Helicopters</td>
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<tr>
<td>C. Laboratory</td>
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<tr>
<td>Have trainees use common lifting equipment. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td><strong>Session II. Mobile Construction Cranes</strong></td>
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<tr>
<td>A. Mobile Construction Cranes</td>
<td></td>
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<tr>
<td>1. Function and Uses</td>
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<td>2. Terminology</td>
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<td>3. Load Rating Capacities</td>
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<tr>
<td>4. Inspecting the Crane</td>
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<tr>
<td>5. Positioning the Crane</td>
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</tbody>
</table>
Session III. Handbooks and Records; Assembly and Disassembly; Communication

A. Handbooks and Records
   1. Crane Manuals and Handbooks
   2. Crane Records
   3. General Crane Safety

B. Laboratory
   Have trainees use crane manuals, perform recordkeeping, and describe crane safety. This laboratory corresponds to Performance Task 2.

C. Crane Assembly
   1. Assembling a Short Boom
   2. Assembling a Long Boom
   3. Disassembly of the Boom

D. Methods and Modes of Communication
   1. Verbal Modes of Communication
   2. Nonverbal Modes of Communication

E. Laboratory
   Have trainees use and interpret hand signals. This laboratory corresponds to Performance Task 3.

Session IV. Review and Testing

A. Review

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

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview
This module covers how to inspect and use common rigging hardware, slings, and tag lines. It also explains how to select, inspect, use, and maintain special rigging equipment, including block and tackle, chain hoists, come-alongs, jacks, and tuggers.

Prerequisites
Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30105-11.

Objectives
Upon completion of this module, the trainee will be able to do the following:
1. Identify and describe the uses of common rigging hardware and equipment.
2. Perform a safety inspection on hooks, slings, and other rigging equipment.
3. Describe common slings and determine sling capacities and angles.
4. Select, inspect, use, and maintain special rigging equipment, including:
   - Block and tackle
   - Chain hoists
   - Come-alongs
   - Jacks
   - Tuggers
   - Wire rope
   - Chain
5. Inspect heavy rigging hardware.
6. Tie knots used in rigging.

Performance Tasks
Under the supervision of the instructor, the trainee should be able to do the following:
1. Perform a safety inspection on hooks, slings, and other rigging equipment.
2. Select, inspect, and use special rigging equipment, including:
   - Block and tackle
   - Chain hoists
   - Come-alongs
   - Jacks
   - Tuggers
   - Wire rope
   - Chain
3. Tie knots used in rigging.
## Materials and Equipment

<table>
<thead>
<tr>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia projector and screen</td>
<td>Various rigging plates and links</td>
</tr>
<tr>
<td><em>Ironworking Level One</em> PowerPoint® Presentation Slides</td>
<td>Various types of slings</td>
</tr>
<tr>
<td>Computer</td>
<td>OSHA 29 CFR Section 1926.251, Rigging Equipment for Material Handling</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Samples of wire rope that have failed inspection</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Rope for tying knots</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td>Block and tackle lifting system</td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td>Sample loads for lifting</td>
</tr>
<tr>
<td>Manufacturer’s literature on different rigging hooks</td>
<td>Spur-geared chain hoist</td>
</tr>
<tr>
<td>Various rigging hooks with wear, cracks, and corrosion</td>
<td>Electric chain hoist</td>
</tr>
<tr>
<td>Manufacturer’s literature on shackles</td>
<td>Ratchet-lever hoist or come-along</td>
</tr>
<tr>
<td>Various types of shackles</td>
<td>Ratchet jack</td>
</tr>
<tr>
<td>Various eyebolts</td>
<td>Screw jack</td>
</tr>
<tr>
<td>Various lifting lugs</td>
<td>Hydraulic jack</td>
</tr>
<tr>
<td>Turnbuckles</td>
<td>Tugger</td>
</tr>
<tr>
<td>Manufacturer’s literature on plate clamps</td>
<td>Copies of the Quick Quiz*</td>
</tr>
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<td></td>
<td>Module Examinations**</td>
</tr>
<tr>
<td></td>
<td>Performance Profile Sheets**</td>
</tr>
</tbody>
</table>

* Located in the back of this module.

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

## Safety Considerations

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

## Additional Resources

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

Teaching Time for This Module

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Rigging Hardware</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Rigging Hardware</td>
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<tr>
<td><strong>Session II. Slings and Tag Lines</strong></td>
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<tr>
<td>A. Slings</td>
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<tr>
<td>B. Laboratory</td>
<td>Have trainees practice performing a safety inspection on hooks, slings, and other rigging equipment. This laboratory corresponds to Performance Task 1.</td>
</tr>
<tr>
<td>C. Tag lines</td>
<td></td>
</tr>
<tr>
<td>D. Laboratory</td>
<td>Have trainees practice tying knots used in rigging. This laboratory corresponds to Performance Task 3.</td>
</tr>
<tr>
<td><strong>Session III. Block and Tackle; Hoists; Ratchet-Lever Hoists and Come-Alongs; Jacks; Tuggers</strong></td>
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<tr>
<td>A. Block and Tackle</td>
<td></td>
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<tr>
<td>B. Chain Hoists</td>
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<tr>
<td>C. Ratchet-Lever Hoists and Come-Alongs</td>
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<tr>
<td>D. Jacks</td>
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<tr>
<td>E. Tuggers</td>
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<tr>
<td>F. Laboratory</td>
<td>Have trainees practice selecting, inspecting, and using special rigging equipment. This laboratory corresponds to Performance Task 2.</td>
</tr>
<tr>
<td><strong>Session IV. Review; Module Examination and Performance Testing</strong></td>
<td></td>
</tr>
<tr>
<td>A. Review</td>
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</tr>
</tbody>
</table>
| B. Module Examination |  1. Trainees must score 70 percent or higher to receive recognition from NCCER.  
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor. |  
| C. Performance Testing |  1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.  
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor. | |
Module Overview

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

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30106-11.

Objectives

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

1. Determine the center of gravity of a load.
2. Identify the pinch points of a crane and explain how to avoid them.
3. Identify site and environmental hazards associated with rigging.
4. Properly attach rigging hardware for routine lifts.
5. Identify the components of a lift plan.
6. Perform sling tension calculations.
7. Determine the weight of beams and basic weight estimation.
8. Explain D/d.

Performance Tasks

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

1. Determine the center of gravity of a load.
2. Properly attach rigging hardware for routine lifts.
3. Perform sling tension calculations.
4. Perform a weight/volume calculation.

Materials and Equipment

Multimedia projector and screen
Ironworking Level One PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
ASME B30.5 Consensus Standard

29 CFR 1926.550, Cranes and Derricks
Completed lift plan
Crane manufacturer’s literature
Typical teeter-totter and weights
Various lifting eyebolts
Rigging hardware
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

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

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

Additional Resources

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


Teaching Time for This Module

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
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<td><strong>Session I. Introduction; Safety</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. General Rigging Safety</td>
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<tr>
<td>1. Personal Protection</td>
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<td>2. Equipment and Supervision</td>
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<td>3. Basic Rigging Precautions</td>
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<td>4. Load Path, Load Control, and Tag Lines</td>
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<td>5. Barricades</td>
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<td>6. Load-Handling Safety</td>
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<td>C. Working Around Power Lines</td>
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<td>D. Site Safety</td>
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<tr>
<td>1. Site Hazards and Restrictions</td>
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<td>E. Emergency Response</td>
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<td>1. Fire</td>
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<td>2. Malfunctions During Lifting Operations</td>
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<tr>
<td>3. Hazardous Weather</td>
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<tr>
<td><strong>Session II. Lifting Personnel; Lift Planning</strong></td>
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<tr>
<td>A. Lifting Personnel</td>
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<tr>
<td>1. Personnel Platform Loading</td>
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<tr>
<td>2. Personnel Platform Rigging</td>
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<tr>
<td>B. Lift Planning</td>
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<tr>
<td>1. Lift Plan Data</td>
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</tr>
</tbody>
</table>
Sessions III and IV. Load Balancing

A. Load Balancing
   1. Center of Gravity
   2. Sling Angles
   3. Lifting Connectors
   4. Choking
   5. Lifting
   6. Block Twisting

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

C. Laboratory
   Have trainees practice performing sling tension calculations. This laboratory corresponds to Performance Task 3.

Session V. Unloading and Yarding; Unloading Joists; Miscellaneous Iron; Structural Iron

A. Unloading and Yarding Materials
   1. Calculating Weight of an Object
   2. Laboratory
      Have trainees practice performing a weight/volume calculation. This laboratory corresponds to Performance Task 4.
   3. Unloading
   4. Using Slings

B. Unloading Joists
   1. Flatbed Trailers

C. Miscellaneous Iron

D. Structural Iron

E. Laboratory
   Have trainees practice properly attaching rigging hardware for routine lifts. This laboratory corresponds to Performance Task 2.

Session VI. Review and Testing

A. Review

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

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

The ironworker uses drawings in all kinds of construction. These drawings contain structural details pertaining to loading conditions, fastening, and erection as well as general framework design and materials. Most drawings are computer-generated.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30107-11.

Objectives

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

1. Identify the materials used in steel-frame buildings.
2. Name the parts of steel frames.
3. Interpret symbols used on plans and drawings, including symbols for:
   - Structural steel
   - Ornamental ironwork
   - Welding

Performance Tasks

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

1. Identify job plans and drawings used for ironworking jobs.
2. Identify the symbols used on selected ironworking plans and drawings.
3. Identify selected structural steel symbols and applications on job plans and drawings.
4. Identify selected ornamental ironwork and welding symbols and applications on job plans and drawings.

Materials and Equipment

Multimedia projector and screen
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
A set of structural drawings for a steel frame building

Actual drawings showing the following:
Shape details
Channels, H beams, and angles
Various structural details
Horizontal beam
Ornamental ironwork drawings
Welding drawings
If available, a section of a steel beam with an identifier marking
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

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

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with trade drawings. 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.

- AASHTO HB-17, Standard Specifications for Highway Bridges.
- ASTM A6, General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

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 Trade Drawings One. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Steel Structures</strong></td>
<td></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Steel Structures</td>
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<tr>
<td>1. Steel Shapes</td>
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<td>2. Detail Drawings</td>
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<td>3. Frames</td>
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<tr>
<td>4. Roofs</td>
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<tr>
<td>C. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Have trainees practice identifying materials used in steel-frame buildings and interpreting symbols used on plans and drawings.</td>
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</tr>
<tr>
<td><strong>Session II. Assembly Drawings</strong></td>
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<tr>
<td>A. Assembly Drawings</td>
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<tr>
<td>1. Base Plate Drawings</td>
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<tr>
<td>2. Framing Plan</td>
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<tr>
<td>3. Fabrication Shop Drawings</td>
<td></td>
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<tr>
<td>B. Laboratory</td>
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</tr>
<tr>
<td>Have trainees identify plans and drawings used for ironworking jobs. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td><strong>Session III. Ornamental Ironwork; Welding Drawings</strong></td>
<td></td>
</tr>
<tr>
<td>A. Ornamental Ironwork Drawings</td>
<td></td>
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<tr>
<td>B. Welding Symbols</td>
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</tbody>
</table>
Session IV. Laboratory
A. Laboratory
1. Have trainees identify the symbols used on selected ironworking plans and drawings, including symbols for:
   • Structural steel
   • Ornamental ironwork
   • Welding
   This laboratory corresponds to Performance Task 2.
2. Have trainees read basic structural drawings. This laboratory corresponds to Performance Task 3.

Session V. 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 types of structures that involve structural ironwork, such as bridges and multistory buildings. Structural ironworkers may also install decking and direct crane operators in hoisting structural components and maneuvering them into position.

Prerequisites
Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30108-11.

Objectives
Upon completion of this module, the trainee will be able to do the following:
1. Identify the types of construction that use structural steel.
2. Describe the steel structure erection process.
3. State the principles of structural stresses.
4. Identify the components of common steel structures.
5. Explain the requirements of bolted connections.
6. List the advantages of pre-engineered structures.

Performance Tasks
Under the supervision of the instructor, the trainee should be able to do the following:
1. Describe different uses for structural steel.
2. Identify selected types, shapes, and grades of structural steel.
3. Identify different types of structural-steel beams.
4. Make bolted connections on structural steel.

Materials and Equipment
Multimedia projector and screen
Ironworking Level One
PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Photographs of structures built with structural steel, both finished and in process
Small sections of different shapes of steel
Selection of bolts
Hardened washers
SMAW, GMAW, and FCAW electrodes
Selection of typical structural ironworker tools
Sufficient number of the following for bolting girder to steel:
• General-use bolts
• Washers
• Piece of structural steel
• Small section of girder
• Appropriate tools
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

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

Safety Considerations
Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with working on or around structural steel. 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.


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 7½ hours are suggested to cover _Structural Ironworking One_. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction; Steel; Steel Beams; Uses of Structural Steel</td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
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<td>B. Steel</td>
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<tr>
<td>1. Steel Products</td>
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<td>2. Steel Shapes</td>
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<td>3. Grades</td>
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<td>C. Steel Beams</td>
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<tr>
<td>D. Use of Structural Steel</td>
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<tr>
<td>1. Pre-Engineered Buildings</td>
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<td>2. Bridges</td>
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<tr>
<td>E. Laboratory</td>
<td></td>
</tr>
<tr>
<td>1. Have trainees describe different uses for structural steel. This laboratory corresponds to Performance Task 1.</td>
<td></td>
</tr>
<tr>
<td>2. Have trainees identify selected types, shapes, and grades of structural steel. This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td>3. Have trainees identify different types of structural-steel beams. This laboratory corresponds to Performance Task 3.</td>
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<tr>
<td>Session II. Work Processes; Erection; Connections; Tools</td>
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<tr>
<td>A. Work Processes</td>
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<tr>
<td>B. Erection of Structural Members</td>
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<tr>
<td>1. Columns</td>
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<td>2. Girders/Joists</td>
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<td>3. Trusses</td>
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<td>4. Bracing</td>
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<td>C. Connections</td>
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<tr>
<td>1. Bolted Connections</td>
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<td>2. Welded Connections</td>
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<td>D. Tools</td>
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<td>E. Laboratory</td>
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<tr>
<td>Have trainees make bolted connections on structural steel. This laboratory corresponds to Performance Task 4.</td>
<td></td>
</tr>
</tbody>
</table>
Session III. 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 describes the purpose and function of aligning and plumbing steel structures, and identifies the tools used for performing plumbing and aligning. It identifies and explains column base and base plate components and foundation failures. It also describes procedures for performing plumbing and aligning.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30109-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:
1. Describe the purpose and function of aligning and plumbing steel structures.
2. Identify the tools and equipment used for aligning and plumbing steel structures.
3. Identify the components of column bases, base plate, and foundation failures.
4. Explain selected plumbing and aligning tasks.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:
1. Identify selected alignment tools.
2. Demonstrate alignment methods.
3. Demonstrate plumbing a structure.

Materials and Equipment

Multimedia projector and screen
Ironworking Level One
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Come-alongs
Steamboat ratchets
Push-pull jacks
Mauls and beaters
Various sizes of shackles
Spools and thimbles
Turnbuckles
Wire-rope clips
Wedges
Drift pins
Transits and levels
Plumb bobs
Spirit levels
Havens clamps
Wire rope
Wood or metal form that can be plumbed and aligned
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

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

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires the trainees to use hand tools. Emphasize the special safety precautions associated with using hand tools. 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.


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 Plumbing, Aligning, and Guying. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction; Purposes and Functions of Alignment; Tools and Equipment; Column Bases; Plumbing Procedures</td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Purpose and Functions of Alignment</td>
<td>____________</td>
</tr>
<tr>
<td>C. Tools and Equipment</td>
<td>____________</td>
</tr>
<tr>
<td>1. Come-Alongs</td>
<td>____________</td>
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<tr>
<td>2. Steamboat Ratchets</td>
<td>____________</td>
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<tr>
<td>3. Push-Pull Jacks</td>
<td>____________</td>
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<tr>
<td>4. Mauls or Beaters</td>
<td>____________</td>
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<tr>
<td>5. Shackles</td>
<td>____________</td>
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<tr>
<td>6. Spools and Thimbles</td>
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<td>7. Turnbuckles</td>
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<tr>
<td>8. Wire-Rope Clips</td>
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<td>9. Wedges</td>
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<tr>
<td>10. Drift Pins</td>
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<tr>
<td>11. Transits and Levels</td>
<td>____________</td>
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<tr>
<td>12. Plumb Bobs</td>
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<tr>
<td>13. Spirit Levels</td>
<td>____________</td>
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<tr>
<td>14. Havens Clamp</td>
<td>____________</td>
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<tr>
<td>D. Laboratory</td>
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<tr>
<td>Have trainees practice identifying selected alignment tools. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>E. Column Bases</td>
<td>____________</td>
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<tr>
<td>F. Plumbing Procedures</td>
<td>____________</td>
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<tr>
<td>G. Laboratory</td>
<td>____________</td>
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<tr>
<td>Have trainees practice demonstrating plumbing a structure. This laboratory corresponds to Performance Task 3.</td>
<td></td>
</tr>
</tbody>
</table>
Session II. Aligning Methods; Review and Testing

A. Aligning Methods

B. Laboratory

Have trainees practice demonstrating alignment methods. This laboratory corresponds to Performance Task 2.

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 teaches principles of safe oxyfuel cutting. Setup, care, and maintenance are covered, as well as procedures and methods for performing various types of oxyfuel cuts.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30110-11.

Objectives

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

1. Identify and explain the use of oxyfuel cutting equipment.
2. Set up oxyfuel equipment.
3. Light and adjust an oxyfuel torch.
4. Shut down oxyfuel cutting equipment.
5. Disassemble oxyfuel equipment.
7. Perform oxyfuel cutting:
   • Straight line and square shapes
   • Piercing and slot cutting
   • Bevels
   • Washing
   • Gouging
8. Operate a motorized, portable oxyfuel gas cutting machine.

Performance Tasks

1. Set up oxyfuel equipment.
2. Light and adjust an oxyfuel torch.
3. Shut down oxyfuel cutting equipment.
4. Disassemble oxyfuel equipment.
5. Change empty cylinders.
6. Cut shapes from various thicknesses of steel, emphasizing:
   • Straight line
   • Square shape
   • Piercing
   • Bevel
   • Slot
7. Perform washing.
8. Perform gouging.

Materials and Equipment

Multimedia projector and screen
Ironworking Level One
PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment

Oxygen cylinder (with cap)
Fuel gas cylinder (with cap)
Extra empty cylinders
Regulators (oxygen and fuel and fuel gas)
Extra regulators with check valves and flashback arrestors
Hose set
A selection of usable and non-usable hoses
Combination cutting torch

continued
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 the handling and use of cylinders and oxyfuel cutting equipment. 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 Z49.1, Safety in Welding, Cutting, and Allied Processes, American Welding Society, Miami, FL.

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 17½ hours are suggested to cover Oxyfuel Cutting. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction to Oxyfuel Safety; Oxyfuel Cutting Equipment, Part One</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Oxyfuel Safety Summary</td>
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<tr>
<td>1. Protective Clothing and Equipment</td>
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<tr>
<td>2. Fire/Explosion Prevention</td>
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<tr>
<td>3. Work Area Ventilation</td>
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<tr>
<td>C. Oxyfuel Cutting Equipment</td>
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<tr>
<td>1. Oxygen</td>
<td></td>
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<tr>
<td>2. Acetylene</td>
<td></td>
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<td>3. Liquefied Fuel Gases</td>
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<tr>
<td>4. Regulators</td>
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<tr>
<td>a. Laboratory</td>
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<tr>
<td>Allow trainees to install and remove regulators from empty oxygen and gas cylinders.</td>
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<tr>
<td>5. Hoses</td>
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<tr>
<td>D. Oxyfuel Cutting Equipment</td>
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<tr>
<td>1. Oxyfuel Cutting Equipment</td>
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<tr>
<td>2. Acetylene</td>
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<td>3. Liquefied Fuel Gases</td>
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<tr>
<td>4. Regulators</td>
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<tr>
<td>a. Laboratory</td>
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<td>5. Hoses</td>
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</tbody>
</table>
Session II. Oxyfuel Cutting Equipment, Part Two
A. Cutting Torches
B. Cutting Torch Tips
C. Tip Cleaners and Tip Drills
D. Friction Lighters
E. Cylinder Cart
F. Soapstone Markers
G. Specialized Cutting Equipment

Session III. Setting Up Oxyfuel Equipment; Controlling the Oxyfuel Torch Flame
A. Setting Up Oxyfuel Equipment
   1. Transporting and Securing Cylinders
   2. Cracking Cylinder Valves
   3. Attaching Regulators
   4. Installing Flashback Arrestors or Check Valves
   5. Connecting Hoses to Regulators
   6. Attaching Hoses to the Torch
   7. Connecting Cutting Attachments (Combination Torch Only)
   8. Installing Cutting Tips
   9. Closing Torch Valves and Loosening Regulator Adjusting Screws
   10. Opening Cylinder Valves
   11. Purging the Torch and Setting the Working Pressures
   12. Testing for Leaks
B. Controlling the Oxyfuel Torch Flame
   1. Oxyfuel Flames
   2. Backfires and Flashbacks
   3. Igniting the Torch and Adjusting the Flame
   4. Shutting Off the Torch

Session IV. Shutting Down Oxyfuel Cutting Equipment; Disassembling Oxyfuel Equipment; Changing Cylinders
A. Shutting Down Oxyfuel Cutting Equipment
B. Disassembling Oxyfuel Equipment
C. Changing Cylinders
D. Laboratory
   Have trainees set up, ignite, adjust, shut down, and disassemble oxyfuel equipment, as well as change cylinders. This laboratory corresponds to Performance Tasks 1 through 5.

Session V. Performing Cutting Procedures, Part One
A. Performing Cutting Procedures
   1. Inspecting the Cut
   2. Preparing for Oxyfuel Cutting with a Hand Cutting Torch
   3. Cutting Thin Steel
   4. Cutting Thick Steel
   5. Piercing a Plate
   6. Cutting Bevels
   7. Washing
   8. Gouging
Session VI. Performing Cutting Procedures, Part Two; Portable Oxyfuel Cutting Machine Operation

A. Laboratory
   Have trainees perform straight-line cutting, square-shape cutting, piercing, slot cutting, bevel cutting, washing, and gouging. This laboratory corresponds to Performance Tasks 6 through 8.

B. Portable Oxyfuel Cutting Machine Operation
   1. Torch Adjustment
   2. Straight-Line Cutting
      a. Laboratory
         Allow trainees to practice straight-line cutting with an oxyfuel machine.
   3. Bevel Cutting
      a. Laboratory
         Allow trainees to practice bevel cutting with an oxyfuel machine.

Session VII. 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 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 Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

D. Performance Accreditation Tasks – Have trainees complete PATs 1 through 3 according to the acceptance criteria.
   1. Have trainees perform PAT 1, Setting Up, Igniting, Adjusting, and Shutting Down Oxyfuel Equipment. This task corresponds to AWS EG2.0, Module 8 – Thermal Cutting Processes, Unit 1 – Manual OFC Principles, Key Indicators: 3 and 4.
   2. Have trainees perform PAT 2, Cutting a Shape from Thin Steel. This task corresponds to AWS EG2.0, Module 8 – Thermal Cutting Processes, Unit 1 – Manual OFC Principles, Key Indicators: 5, 6, and 7.
   3. Have trainees perform PAT 3, Cutting a Shape from Thick Steel. This task corresponds to AWS EG2.0, Module 8 – Thermal Cutting Processes, Unit 1 – Manual OFC Principles, Key Indicators: 5, 6, and 7.
Module Overview

The steel or iron that ironworkers erect and mount is normally prepared prior to arriving on site, but there may be times when an ironworker must cut or weld steel. This module introduces the trainee to different types of arc welding that may be used on a site.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30110-11 and 29102-09.

Objectives

Upon completion of this module, the trainee will be able to do the following:
1. Identify different welding processes and welding equipment.
2. State safety precautions associated with arc welding.
3. Identify and explain shielded metal arc welding (SMAW) electrodes.
4. Identify weld joints, their dimensions, and their applications from weld symbols and drawings.
5. Identify different types of arc welding machines.
6. Explain how to set up and use SMAW equipment to weld steel.
7. Explain the different codes governing welding.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:
1. Identify welding equipment.
2. Identify SMAW electrodes.
3. Identify welding joints from weld symbols and drawings.
4. Set up SMAW equipment and weld steel plate.

Materials and Equipment

Multimedia projector and screen
Ironworking Level One PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Access to different types of operational cutting and welding equipment:
- SMAW equipment
- GMAW/FCAW equipment
- GTAW equipment
- Plasma arc cutting equipment
- Air carbon arc cutting equipment
Access to different types of SMAW electrodes
Access to an electrode storage oven
Access to all basic welding tools
Access to all welding-specific PPE, including applicable respirators
Access to welding lab facilities
Access to manufacturer’s manuals for all available welding machines
Copies of company’s confined space permits
Copies of company’s hot work permits
Copies of MSDSs and related labels for hazardous materials that may have been stored in containers
Examples of good and defective welds made with different types of SMAW electrodes
Examples of different welding procedure specifications (WPS)
Welded example coupons for each type of basic joint
Miscellaneous mild steel plate coupons

continued
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines for working on or with welding equipment. 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.


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 22½ hours are suggested to cover Introduction to Arc Welding. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Sessions I and II. Introduction; Welding and Cutting Processes; Safety</td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Welding and Cutting Processes</td>
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<tr>
<td>1. Shielded Metal Arc Welding</td>
<td></td>
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<td>2. GMAW/FCAW</td>
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<td>3. Gas Tungsten Arc Welding</td>
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<td>4. Plasma Arc Cutting Process</td>
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<tr>
<td>5. Air Carbon Arc Cutting Process</td>
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<tr>
<td>6. Shielding Gas</td>
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</tbody>
</table>
C. Safety

1. PPE
2. Ventilation
3. Hot Work Permits and Fire Watches
4. Cutting Containers
5. Oxygen Hazards
6. Electrical Safety

D. Laboratory
Have trainees identify different types of welding equipment. This laboratory corresponds to Performance Task 1.

Session III. SMAW Electrodes; Selecting SMAW Electrodes; SMAW Filler Metal Storage and Control; Filler Metal Traceability Requirements

A. SMAW Electrodes
1. AWS Filler Metal Specification System
2. Electrode Classification System
3. Manufacturer’s Classification
4. Electrode Sizes

B. Selecting SMAW Electrodes
1. Electrode Groups
2. Electrode Selection Considerations

C. SMAW Filler Metal Storage and Control
1. Code Requirements
2. Receiving Filler Metal
3. Storing Filler Metal
4. Storage Ovens

D. Filler Metal Traceability Requirements

E. Laboratory
Have trainees identify SMAW electrodes. This laboratory corresponds to Performance Task 2.

Session IV. Joint Design

A. Joint Design
1. Load Considerations
2. Types of Joints
3. Types of Welds
4. Welding Position
5. Codes and Welding Procedure Specifications
6. Weld Symbols and Drawings

B. Laboratory
Have trainees identify welding joints from weld symbols and drawings. This laboratory corresponds to Performance Task 3.
Sessions V–VIII. Arc Welding Machines; Arc Welding with SMAW Equipment; Codes Governing Welding

A. Arc Welding Machines

B. Arc Welding with SMAW Equipment
   1. Preparing the Welding Area
   2. Preparing the Weld Coupons
   3. Electrodes
   4. Preparing the Welding Machine
   5. Striking an Arc
   6. Dealing with Arc Blow
   7. Making Stringer and Weave Beads

C. Codes Governing Welding

D. Laboratory
   Have trainees set up SMAW equipment and weld steel plate. This laboratory corresponds to Performance Task 4.

Session IX. 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 basics of bar joists used to support building roofs and decks including yarding, handling, rigging, and erection.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30110-11, 29102-09, and 30112-11.

Objectives

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

1. Recognize the various types of bar joists.
2. Explain how bar joists are designated.
3. Describe the proper procedures for rigging and storing steel joists.
4. Describe the proper erection procedures for bar joists.
5. Explain the use of joist girders in steel joist construction systems.

Performance Tasks

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

1. Identify selected types, shapes, and grades of bar joists and joist girders.
2. Interpret connection details for bar joists and girders.
3. Demonstrate the ability to handle, store, and rig different types of bar joists and girders.
4. Identify different bridging and mounting devices used with bar joists and joist girders.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Erection drawings showing bridging spacing on joists
- Copies of the Quick Quiz*
- Module Examinations**
- Performance Profile Sheets**

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

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with working on bar joists and joist girders. 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.


### 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 *Bar Joists and Girders.* You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Open-Web Bar Joists; Erecting Steel Joists; Joist Girders</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Open-Web Bar Joists</td>
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<tr>
<td>1. Types and Designations</td>
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<tr>
<td>2. Handling, Storing, and Rigging</td>
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<td>3. Bridging</td>
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<td>4. End Bearing</td>
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<tr>
<td>C. Erecting Steel Joists</td>
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<tr>
<td>D. Joist Girders</td>
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<tr>
<td><strong>Session II. Laboratory; Review and Testing</strong></td>
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</tr>
<tr>
<td>A. Laboratory</td>
<td></td>
</tr>
<tr>
<td>1. Have trainees identify selected types, shapes, and grades of bar joists and joist girders. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>2. Have trainees interpret connection details for bar joists and girders. This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td>3. Have trainees demonstrate the ability to handle, store, and rig different types of bar joists and girders. This laboratory corresponds to Performance Task 3.</td>
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<tr>
<td>4. Have trainees identify different bridging and mounting devices used with bar joists and joist girders. This laboratory corresponds to Performance Task 4.</td>
<td></td>
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<tr>
<td>B. Review</td>
<td></td>
</tr>
<tr>
<td>C. Module Examination</td>
<td></td>
</tr>
<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
<td></td>
</tr>
<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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<tr>
<td>D. Performance Testing</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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</tbody>
</table>
Module Overview

This module identifies and explains decking types and profiles and how decking is packaged, shipped, and stored. It describes erecting decking and placing concrete safely. The effects of deck penetrations and damage are also covered.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30110-11, 29102-09, 30112-11, and 30113-11.

Objectives

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

1. Identify and explain types of decking and deck profiles.
2. Describe how decking is packaged, shipped, and stored.
3. Erect decking and observe job-site safety.
4. Explain the effects of deck penetrations and damage.
5. Demonstrate how to place concrete.

Performance Tasks

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

1. Demonstrate safe lifting methods.
2. Properly place decking.
3. Identify safety precautions for decking operations.
4. Demonstrate proper decking layout.
5. Identify types of decking.

Materials and Equipment

Multimedia projector and screen
Ironworking Level One
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Bundle tags
OSHA Standard 29 CFR, 1926 Subpart R
Hoist and materials to simulate lifting bundles
Metal decking

Fasteners
Tools for installing fasteners, including:
   Screwdriver
   Air-driven tools
   Powder-actuated tools
Samples of good and bad welds
Welding equipment
Concrete
Tools for mixing and placing concrete
Copies of the Quick Quizzes*
Module Examinations**
Performance Profile Sheets**

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

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may/will require the trainees to work with concrete, lift, and place decking. Emphasize the special safety precautions associated with working with concrete. Discuss lifting safety. This module may/will require the trainees to weld. Emphasize the special safety precautions associated with welding. Ensure that trainees are briefed on the proper site or shop safety and fire procedures.

Additional Resources

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


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2 1/2 hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover Metal Decking. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction; Packaging; Erecting Decking and Observing Job-Site Safety</td>
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<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>1. Composite Floor Deck</td>
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<td>2. Roof Deck</td>
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<td>3. Cellular Deck</td>
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<td>4. Form Deck</td>
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<tr>
<td>B. Laboratory</td>
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<tr>
<td>1. Loading and Shipping</td>
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<td>2. Receiving and Unloading</td>
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<td>3. Storage and Protection</td>
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<tr>
<td>C. Packaging</td>
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<tr>
<td>1. General Safety</td>
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<td>2. Lifting Safety</td>
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<td>3. Safe Working Platform</td>
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<tr>
<td>D. Observing Job-Site Safety</td>
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<tr>
<td>E. Laboratory</td>
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<tr>
<td>1. Have trainees practice identifying types of decking. This laboratory corresponds to Performance Task 5.</td>
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<td>F. Placing Decking</td>
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<td>G. Laboratory</td>
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<tr>
<td>1. Have trainees practice properly placing decking. This laboratory corresponds to Performance Task 2.</td>
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<td>H. Decking Capacities</td>
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<td>I. Laboratory</td>
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<tr>
<td>1. Have trainees identify safety precautions for decking operations. This laboratory corresponds to Performance Task 3.</td>
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</tbody>
</table>
Session II. Fastening and Installing Decking
A. Attaching Decking
B. Welding Decking
C. Shear Studs
D. Side Lap Connections
E. Housekeeping

Session III. Deck Damage and Penetrations; Placing Concrete
A. Deck Damage and Penetrations
B. Placing Concrete
C. Laboratory
   Have trainees demonstrate proper decking layout. This laboratory corresponds to Performance Task 4.

Sessions IV. Review and Testing
A. Module 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 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.
Field Fabrication
Annotated Instructor’s Guide

Module Overview

This module identifies the safety hazards associated with field fabrication. It explains how to use common layout tools and fabricate C-shapes, T-shapes, and W-shapes to given dimensions.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Ironworking Level One, Modules 30101-11 through 30110-11, 29102-09, and 30112-11 through 30114-11.

Objectives

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

1. Identify safety hazards associated with ironworking fabrication.
2. Use common layout tools.
3. Fabricate angle iron to given dimensions.
4. Fabricate channel iron to given dimensions.
5. Fabricate T-shapes to given dimensions.
6. Fabricate W-shapes to given dimensions.

Performance Tasks

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

1. Use common layout tools.
2. Fabricate angle iron to given dimensions.
3. Fabricate channel iron to given dimensions.
4. Fabricate T-shapes to given dimensions.
5. Fabricate W-shapes to given dimensions.

Materials and Equipment

Multimedia projector and screen
Ironworking Level One
PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Magnetic drill
Scriber
Combination set
Straightedge
Protractor
Dividers
Trammel points

Tri-square
Steel rule
Steel square
Prick punch
Center punch
Band saw
Channel iron
Angle iron
T-shapes
W-shapes
Oxyfuel cutting equipment
Side grinder
Oxyacetylene torch
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

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

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires the trainees to use oxyfuel cutting equipment and oxyacetylene torches. Emphasize the special safety precautions associated with using torches. Ensure that trainees are briefed on the proper site or shop safety and fire procedures.

Additional Resources

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


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Field Fabrication One*. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction; Safety; Layout Tools</td>
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<tr>
<td>A. Introduction</td>
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<td>B. Safety</td>
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<tr>
<td>C. Layout Tools</td>
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<tr>
<td>1. Scribers</td>
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<td>2. Steel Rules</td>
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<td>3. Steel Squares</td>
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<td>4. Combination Set</td>
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<td>5. Protractors</td>
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<td>6. Dividers</td>
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<td>7. Trammel Points</td>
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<td>8. Prick Punches</td>
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<td>9. Center Punches</td>
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<td>10. Straightedges</td>
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<td>11. Magnetic Drill</td>
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<tr>
<td>Sessions II and III. Layout Tasks</td>
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<tr>
<td>A. Base Line Layout</td>
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<td>B. Scribing Lines</td>
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<tr>
<td>1. Laboratory</td>
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<td>2. Laboratory</td>
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<tr>
<td>Have trainees practice laying out right angles using the arc method and 3-4-5 method.</td>
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<tr>
<td>2. Laboratory</td>
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<tr>
<td>Have trainees practice scribing parallel, perpendicular, and angled lines.</td>
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<tr>
<td>C. Divider and Trammel Point Use</td>
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<tr>
<td>1. Laboratory</td>
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<tr>
<td>Have trainees practice using dividers and trammel points.</td>
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</tbody>
</table>
D. Laying Out Bolt Pattern Templates

1. Laboratory
   Have trainees practice using common layout tools. This laboratory corresponds to Performance Task 1.

Sessions IV and V. Fabrication Tasks

A. Fabricating Angle Iron

1. Laboratory
   Have trainees practice fabricating angle iron to given dimensions. This laboratory corresponds to Performance Task 2.

B. Fabricating Channel Iron

1. Laboratory
   Have trainees practice fabricating channel iron to given dimensions. This laboratory corresponds to Performance Task 3.

C. Fabricating T-Shapes

1. Laboratory
   Have trainees practice fabricating T-shapes to given dimensions. This laboratory corresponds to Performance Task 4.

D. Fabricating W-Shapes

1. Laboratory
   Have trainees practice fabricating W-shapes to given dimensions. This laboratory corresponds to Performance Task 5.

Sessions VI. Review and Testing

A. Module 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 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.