MODULE OVERVIEW

This module explains the role of safety in the construction crafts. Trainees will learn how to identify and follow safe work practices and procedures as well as how to properly inspect and use safety equipment. Trainees will be able to describe safe work procedures for lifting heavy objects, fighting fires, and working around electrical hazards.

PREREQUISITES

There are no prerequisites for this module.

OBJECTIVES

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

1. Explain the role that safety plays in the construction crafts.
2. Describe the meaning of job-site safety.
3. Describe the characteristics of a competent person and a qualified person.
4. Explain the appropriate safety precautions to take around common job-site hazards.
5. Demonstrate the use and care of appropriate personal protective equipment (PPE).
6. Properly don and remove personal protective equipment (safety goggles, hard hat, and personal fall protection).
7. Follow the safety procedures required for lifting heavy objects.
8. Describe safe behavior on and around ladders and scaffolds.
9. Explain the importance of Hazard Communications (HazCom) and material safety data sheets (MSDSs).
10. Describe fire prevention and firefighting techniques.
11. Define safe work procedures to use around electrical hazards.

PERFORMANCE TASKS

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

1. Inspect PPE to determine if it is safe to use (PPE should include safety goggles, hard hat, gloves, safety harness, and safety shoes).
2. Properly don and remove PPE (safety goggles, hard hat, and personal fall protection).
3. Demonstrate safe lifting procedures.

MATERIALS AND EQUIPMENT LIST

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Copies of your local code
Variety of communication tags and signs
Dull and sharp cutting tools
Code of Federal Regulations Part 1910
OSHA 29 CFR 1926
OSHA Form 300
New and damaged hoses and regulators
Materials to create hypothetical fire hazards
Variety of safety tags
Variety of types of personal protective equipment, including:
- Hard hats
- Safety glasses, goggles, and face shields
- Safety harnesses
- Gloves
- Safety shoes
- Hearing protection
- Respiratory protection

Copies of your company's fall protection plan

Variety of ladders and scaffolds, including:
- Straight ladders
- Extension ladders
- Stepladders
- Manufactured scaffolds
- Rolling scaffolds

Sample material safety data sheet (MSDS)
Variety of fire extinguishers
Module Examinations*
Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

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

ADDITIONAL RESOURCES

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

Construction Back Safety. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

Construction Confined Space Entry. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

Construction Electrical Safety. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

Construction Fall Protection: Get Arrested! Videocassette. 11 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

Construction Lockout/Tagout. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

Construction Safety, 1996. Jimmie Hinze. Englewood Cliffs, NJ: Prentice Hall.

Construction Safety Council Home Page, http://buildsafe.org/home.htm.

Construction Safety Manual, 1998. Dave Heberle. New York: McGraw-Hill.

Construction Stairways and Ladders. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

Construction Welding Safety. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

Field Safety, 2003. NCCER. Upper Saddle River, NJ: Prentice Hall.

Handbook of OSHA Construction Safety and Health, 1999. James V. Eidson et al. Boca Raton, FL: Lewis Publishers, Inc.

HazCom for Construction. Videocassette. 11 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.

NAHB-OSHA Jobsite Safety Handbook, 1999. Washington, DC: Home Builder Press. Available online at www.osha.gov.

Occupational Safety and Health Standards for the Construction Industry, latest edition. Washington, DC: Occupational Safety and Health Administration, U.S. Department of Labor, U.S. Government Printing Office.

Safety Orientation, 2003. NCCER. Upper Saddle River, NJ: Prentice Hall.

Safety Technology, 2003. NCCER. Upper Saddle River, NJ: Prentice Hall.

United States Department of Labor, Occupational Safety and Health Administration Home Page, http://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 15 hours are suggested to cover *Basic Safety.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Accidents	
A. Accident Causes and Results	_____
B. Safety Policies and Regulations	_____
C. Reporting Accidents	_____
Session II. Job-Site Hazards	
A. Construction Job-Site Hazards	_____
B. Working Safely with Job Hazards	_____
Session III. Personal Protective Equipment and Lifting	
A. Personal Protective Equipment	_____
B. Lifting	_____
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 Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
Session IV. Aerial Work	
A. Ladders and Scaffolds	_____
B. Scaffolds	_____
Session V. Hazard Communication and Fire Safety	
A. Hazard Communication Standard	_____
B. Fire Safety	_____
Session VI. Electrical Safety, Review, and Module Examination	
A. Basic Electrical Safety Guidelines	_____
B. Working Near Energized Electrical Equipment	_____
C. If Someone Is Shocked	_____
D. Review	_____
E. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

MODULE OVERVIEW

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

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills,* Modules 00101-04 through 00105-04. This module is an elective. To receive a successful completion, you must take this module or Modules 00107-04 and 00108-04.

OBJECTIVES

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

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

PERFORMANCE TASKS

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

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

MATERIALS AND EQUIPMENT LIST

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Copies of your local code
OSHA 29 CFR 1926
Identification tags for slings
Copies of Figure 15 with the callouts covered
Damaged slings or photos of damaged slings
Two glasses
One liter of water
Anchor shackles and chain shackles
Various types of pins, including:
  Screw pin shackle
  Round pin or straight pin shackle
  Safety shackle
Damaged shackles and pins
Damaged and undamaged eyebolts
Undamaged lifting clamps
Rusty or corroded lifting clamps
Wire brush to clean lifting clamps
Damaged and undamaged rigging hooks
Module Examinations*
Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

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

NOTE

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

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

ADDITIONAL RESOURCES

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

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

High Performance Slings and Fittings for the New Millennium, 1999 Edition. Dennis St. Germain. Aston, PA: I & I Sling, Inc.

Mobile Crane Manual, 1999. Donald E. Dickie, D. H. Campbell. Toronto, Ontario, Canada: Construction Safety Association of Ontario.

Rigging Manual, 1997. Toronto, Ontario, Canada: Construction Safety Association of Ontario.

TEACHING TIME FOR THIS MODULE

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

Topic	**Planned Time**
Session I. Slings, Part One	
A. Introduction	_____
B. Synthetic Slings	_____
Session II. Slings, Part Two	
A. Alloy Steel Chain Slings	_____
B. Wire Rope Slings	_____
C. Performance Testing (Task 1)	_____
Session III. Hitches	
A. Vertical Hitch	_____
B. Choker Hitch	_____
C. Basket Hitch	_____
D. Performance Testing (Task 2)	_____
Session IV. Rigging Hardware, Part One	
A. Shackles	_____
B. Eyebolts	_____

Session V. Rigging Hardware, Part Two

A. Lifting Clamps _____
B. Rigging Hooks _____
C. Performance Testing (Task 3) _____

Session VI. Sling Stress and Hoists

A. Sling Stress _____
B. Chain Hoists _____

Session VII. Rigging Operations and Practice, Part One

A. Rated Capacity _____
B. Sling Attachment _____
C. Hardware Attachment _____
D. Performance Testing (Task 4) _____

Session VIII. Rigging Operations and Practice, Part Two

A. Load Control _____
B. ANSI Hand Signals _____
C. Review _____
D. Module Examination _____
   1. Trainees must score 70% or higher to receive recognition from NCCER.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

E. Performance Testing (Tasks 5–8) _____
   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 Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module covers the history of the industrial coatings trade, and the types of jobs and work environments that are found in the field. It describes apprenticeship, training programs, and career opportunities. The responsibilities and characteristics a worker should possess are also described.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*, Modules 00101-04 and 00106-04.

OBJECTIVES

When you have completed this module, you will be able to do the following:

1. Define the composition and purpose of different industrial coatings.
2. Discuss some of the causes of premature failure of coatings.
3. Define and list the components of process control.
4. Define quality control and quality assurance.
5. State the purpose of preparing test sections for demonstration processes.
6. Explain some of the preparation and application methods and how some of the coatings are used.
7. Identify the responsibilities of a person working in the industrial coatings profession.
8. State the personal characteristics of a professional.
9. Explain the importance of safety in working with industrial coatings.

PERFORMANCE TASKS

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

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Copy of an employee manual

Company policy and procedures manual

Company safety manual

Sample coatings specifications

Common hand tools, including:
- Hand abrasives
- Scrapers and putty knives
- Wire brushes
- Chipping hammers

Common power tools with related safety instruction manuals, including:
- Grinders and sanders
- Power wire brushes
- Needle guns and air chisels
- MBXTool
- Vacuum shrouds

Various types of respirators

Micrometers

Comparators

Job announcements for an industrial coating and lining application specialist from local newspapers or trade journals

Copies of the Trade Terms Quiz*

Module Examinations**

* Located at the back of this module.

** Located in the Test Booklet.

SAFETY CONSIDERATIONS

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

ADDITIONAL RESOURCES

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

NACE International, www.nace.org

The Protective Coating User's Handbook, Dr. Louis D. Vincent, 2004. Houston, TX: NACE Press.

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.

Topic	**Planned Time**
Session I. Industrial Coatings; Corrosion Control; Tools	
A. Introduction	_____
B. Preview of Industrial Coatings	_____
C. Definition of and Reasons for Coating	_____
D. Corrosion Overview	_____
E. Coatings Failure Causes	_____
F. Tools of the Trade	_____
G. Process Control	_____
Session II. Professional Roles; Career Opportunities; Construction Training; Review and Testing	
A. Coating Professional Roles	_____
B. Keys to Professional Success	_____
C. Career Opportunities	_____
D. Formal Construction Training	_____
E. Review	_____
F. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

Surface Preparation
Annotated Instructor's Guide

Module 69102-09

MODULE OVERVIEW

This module describes various surface preparation techniques, including solvent cleaning, hand tool cleaning, power tool cleaning, abrasive blasting, and waterjetting. It explains how both steel and concrete structures are prepared for coating application. It also discusses overcoating, debris management, and safety.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum,* Modules 00101-04 and 00106-04; and *Industrial Coating and Lining Application Specialist Level One,* Module 69101-09.

OBJECTIVES

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

1. Define surface preparation and list reasons for its importance.
2. Define the goals of surface preparation.
3. Recognize the surface conditions of steel substrates, mill scale, and steel fabrication surface defects.
4. State surface preparation methods and reasons for coating galvanized steel, weathering steel, and other metals.
5. List properties of concrete, types of concrete surfaces, reasons for assessing and repairing concrete surfaces prior to surface preparation, and methods of surface preparation of concrete surfaces.
6. State how, when, and why to use solvents, hand tools, and power tools for cleaning.
7. State how, when, and why dry abrasive blasting is done.
8. State how, when, and why water cleaning is done.
9. Explain reasons for surface preparation and consequences of poor preparation methods.
10. State when overcoating is used, and how surfaces are prepared for overcoating.

PERFORMANCE TASKS

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

1. Perform solvent cleaning.
2. Perform hand tool cleaning.
3. Perform power tool cleaning.
4. Identify and assist in the setup of dry abrasive blast cleaning equipment.
5. Identify and assist in the setup of wet abrasive blast cleaning equipment.
6. Identify and assist in the setup of water cleaning and jetting equipment.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment, including:

- Eye protection
- Face protection
- Work gloves
- Respirators
- Protective clothing

Coating specifications

Copies of industry standards for surface preparation

Variety of solvents, with related product data sheets and MSDSs

Variety of chemical strippers, with related product data sheets and MSDSs

Samples of defects in steel fabrication

Samples of properly prepared metal

Samples of several types of surfaces

(continued)

Coatings

Coating application tools

pH paper

Hand tools, including:

- Abrasive pads
- Scrapers
- Putty knives
- Wire brushes
- Chipping hammers

MBX Bristle Blaster

Rags

Putty knives

Abrasive blast cleaning equipment and accessories

Operator's manual and safety manual for blast cleaning equipment

Samples of abrasives used for blasting

Comparators and other surface profile evaluation tools

Safety equipment for waterjetting operations

Waterjetting equipment

Safety videos/DVDs

TV/VCR/DVD player

Copies of the Trade Terms Quiz*

Module Examinations**

Performance Profile Sheets**

* Located at the back of this module.

** Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. The module requires trainees to use chemicals and solvents. Ensure that all trainees are briefed on chemical safety procedures. This module also requires trainees to perform abrasive blasting and water cleaning. Ensure that all trainees have the proper protective equipment and are briefed on all appropriate safety procedures.

ADDITIONAL RESOURCES

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

Abrasive Blasting, Final Report, Prepared by Midwest Research Institute (MRI) for the Office of Air Quality Planning and Standards (OAQPS), U.S. Environmental Protection Agency (EPA), under Contract No. 68-D2-0159, Work Assignment Nos. 2-01 and 4-02. September 1997.

Coating Inspector Program Level 1 © NACE International, 2003, January 2007.

Coating Inspector Program Level 2 © NACE International, 2004, January 2007.

Coatings and Color Manual COMDTINST M10360.3C COMTNOTE 10360 9 June 2007.

Maintenance Coating of Weathering Steel: Field Evaluation and Guidelines. Final Report, FHWA – RD-92-055, March 1992.

New Concepts for Coating Protection of Steel Structures – Stp 841: A Symposium by D.M. Berger, R.F. Wint, Steel Structures Painting Council (U.S.), ASTM Committee D-1 on Paint and Related Coatings and Material.

Solvent Waste Management, Inc. website http://www.solventwasher.com/index.htm

Technical Advisory Uncoated Weathering Steel in Structures T 5140.22. U.S. Department of Transportation Federal Highway Administration, October 3, 1989.

Tips on Portable Shot Blasting, Heather Bayne, Journal of Protective Coatings & Linings, May 2007.

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 100 hours are suggested to cover *Surface Preparation*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to performance tasks, the proficiency of the trainees may be noted during these exercises for performance testing purposes.

Topic **Planned Time**

Session I. Introduction to Surface Preparation; Safety

A. Introduction _____

B. Surfaces and Surface Preparation _____

C. Personal Safety and Personal Protective Equipment _____

Session II-IV. Solvent Cleaning

A. Solvent Cleaning _____

1. Laboratory _____

Have trainees practice performing solvent cleaning. This laboratory corresponds to Performance Task 1.

Session V-VII. Hand Tool Cleaning

A. Hand Tool Cleaning _____

1. Laboratory _____

Have trainees practice performing hand tool cleaning. This laboratory corresponds to Performance Task 2.

Session VIII-XI. Power Tool Cleaning

A. Power Tool Cleaning _____

1. Laboratory _____

Have trainees practice performing power tool cleaning. This laboratory corresponds to Performance Task 3.

Session XI-XIV. Dry and Wet Abrasive Cleaning

A. Measure the pressure of the air at the blast nozzle and the nozzle orifice. _____

1. Laboratory _____

Have trainees practice performing tests with a nozzle pressure gauge and nozzle aperture gauge.

2. Laboratory _____

Have trainees practice measuring surface profile using a surface profile gauge and Testex Tape.

B. Wet and Dry Abrasive Cleaning _____

1. Laboratory _____

Have trainees practice identifying wet and dry abrasive blast cleaning equipment and PPE. Have them assist a qualified person in setting up the equipment for use. This laboratory corresponds to Performance Tasks 4 and 5.

Session XV-XVIII. Water Cleaning and Waterjetting

A. Water Cleaning and Waterjetting _____

1. Laboratory _____

Have trainees practice identifying water cleaning and waterjetting equipment and PPE. Have them assist a qualified person in setting up the equipment for use. This laboratory corresponds to Performance Task 6.

Session XIX-XXX. Surface Preparation of Masonry and Concrete; Safety and Debris Management

A. Surface Preparation of Masonry and Concrete _____

1. New Concrete _____
2. Old Concrete _____

B. Safety and Debris Management _____

Session XXXI-XL. Review and Testing

A. Review _____

B Module Examination _____

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

Industrial Coatings

Annotated Instructor's Guide

Module 69103-09

MODULE OVERVIEW

This module describes various types of industrial coatings and explains how to prepare and mix them. It also describes hazardous waste-handling procedures.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*, Modules 00101-04 and 00106-04; and *Industrial Coating and Lining Application Specialist Level One*, Modules 69101-09 and 69102-09.

OBJECTIVES

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

1. State the purpose of each coating component.
2. List physical properties of paints.
3. List basic coating additives.
4. State the purpose for solvents (thinners) in cleaning.
5. State the difference between convertible and non-convertible coatings.
6. List curing mechanisms for coatings.
7. Identify conditions that must be considered before selecting a coating/lining.
8. Describe the coverage of coatings and learn to calculate wet- and dry-film thickness.
9. Locate and practice safety procedures listed on the material safety data sheet (MSDS).
10. List safety equipment and correct personal protective equipment (PPE) for use during coatings mixing operations.
11. Describe disposal techniques for hazardous and non-hazardous waste.

PERFORMANCE TASKS

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

1. Calculate dry film thickness (DFT).
2. Read and understand an MSDS.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Manufacturers' literature on coatings

Samples of powder and pipeline coatings or manufacturers' literature on powder and pipeline coatings

MSDS for solvents or other coating product

Concrete blocks

Concrete coatings

Safety video/DVD

TV/VCR/DVD player

Copies of the Trade Terms Quiz*

Module Examinations**

Performance Profile Sheets**

* Located at the back of this module.

** Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. The module requires trainees to observe the use of chemicals and solvents. Ensure that all trainees are briefed on chemical safety procedures.

ADDITIONAL RESOURCES

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

Waste Stream Measurement and Analysis© Copyright 1995, 2007 by the California Integrated Waste Management Board. http://www.ciwmb.ca.gov/LGCentral/WasteStream.

Coating Inspector Program Level 1 © NACE International, 2003, January 2007.

Coating Inspector Program Level 2 © NACE International, 2004, January 2007.

Protective Coatings and Linings Course II © NACE International, 1998, January 2005.

Control of Pipeline Corrosion, 2nd Edition, A.W. Peabody, edited by R.L. Bianchetti, © NACE International, 1967, 2001.

Introduction to Treatment, Storage and Disposal Facilities (40 CFR Parts 264/265, Subpart A-E), United States Environmental Protection Agency, September 2005, Solid Waste and Emergency Response (5305W) EPA530-K-05-017.

Preventing Occupational Fatalities in Confined Spaces, NIOSH Alert: January 1986, DHHS (NIOSH publication No. 86-110).

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 *Industrial Coatings*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to performance tasks, the proficiency of the trainees may be noted during these exercises for performance testing purposes.

Topic	**Planned Time**
Session I. Introduction to Protective Coatings; Coating Material Properties; Curing Mechanisms	
A. Introduction	_____
B. Coating Material Properties	_____
C. Curing Mechanisms	_____
Session II. Service Conditions; Concrete Coatings; Specialty Coatings	
A. Service Conditions	_____
B. Concrete Coatings	_____
C. Specialty Coatings	_____
Session III. Coating Safety; Mixing and Thinning	
A. Coating Safety	_____
B. Mixing and Thinning	_____
C. Laboratory	_____
Have trainees practice performing DFT calculations. This laboratory corresponds to Performance Task 1.	

Session IV. Material Safety Data Sheets

A. MSDS _____

B. Laboratory _____

Have trainees practice reading and understanding an MSDS sheet. This laboratory corresponds to Performance Task 2.

Session V. Waste Management

A. Waste Management _____

Session VI. Review and Testing

A. Review _____

B. Module Examination _____

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

Coating Application
Annotated Instructor's Guide

Module 69104-09

MODULE OVERVIEW

This module introduces basic coating application. It describes the information found in coating specifications and product data sheets. It covers protective coverings and how to use them, as well as the equipment and techniques used to mix various types of coatings.

Also included are descriptions of equipment and ways to apply coatings manually using brushes, rollers, and mitts. It also describes spraying methods such as conventional air spray, HVLP, airless, and air-assisted airless spray.

This module describes the environmental conditions necessary when applying coatings, and the quality control and inspections required during coating application. Common coating application failures are discussed, along with ways to remedy them. Specialty spray systems and their application methods are also briefly covered.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*, Modules 00101-04 and 00106-04; and *Industrial Coating and Lining Application Specialist Level One*, Modules 69101-09 through 69103-09.

OBJECTIVES

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

1. Locate information about application equipment and other things on a coating specification and a product data sheet (PDS).
2. Mix one or more of the following using proper PPE:
   - Single-component coatings
   - Multi-component liquid coatings
   - Coatings with a powder component

   Consider the importance of mixing time and the condition and appearance of the mixed material.
3. Describe induction time and pot life in relationship to material temperature.
4. Define viscosity, list the methods of viscosity control, and reduce the viscosity of coatings.
5. Install protective coverings and discuss the safe use of basic application equipment (setup, operation, adjustment, cleanup) on simple structures; list the strengths, weaknesses, and limitations of each piece; and identify basic application equipment problems with:
   - Brush, roller, mitt
   - Trowel, squeegee
   - Spray (air, airless, air-assisted airless, HVLP)
6. Demonstrate correct application techniques with:
   - Brush, roller, mitt
   - Trowel, squeegee
   - Spray (air, airless, air-assisted airless, HVLP)
7. Describe and demonstrate striping procedures.
8. Recognize the importance of the following during coating application operations:
   - Impact of environmental conditions on application and drying
   - Achieving correct thickness of each coating layer
   - Achieving a pinhole/holiday-free lining
9. Identify application defects during and after coating.
10. Describe how to calculate wet film thickness (WFT) from DFT, how to measure WFT, and explain how to calculate percentage of thinners by volume.
11. Recognize the importance of achieving a cured and a solvent-resistant film.

PERFORMANCE TASKS

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

1. Operate and maintain mixing blades/equipment.
2. Mix single-component coatings, multi-component liquid coatings, and coatings with powder component.
3. Filter/strain mixed coating.
4. Demonstrate the safe use of basic application equipment (setup, operation, adjustment, cleanup) on simple structures:
   - Brush, roller, mitt
   - Trowel, squeegee
5. Identify and assist with the setup of one or more types of spray equipment.
6. Demonstrate striping procedures using a brush.
7. Use and maintain a WFT gauge.
8. Measure WFT and calculate DFT.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Coating specifications
MSDSs for coating products
Product data sheets (PDS) for coating products
PDS for multi-component coating
Protective sheeting
Drop cloths
Masking tape
Coating mixing tools
Dip roller trays and buckets
Coating strainers and filters
Single-component and multi-component coatings
Coatings with a powder component
WFT gauges
Brushes
Mitts
Rollers
Trowels
Squeegees
Spray application equipment
Installations to be coated
Copies of the Trade Terms Quiz *
Module Examinations**
Performance Profile Sheets**

* Located at the back of this module.

**Located in the Test Booklet.

SAFETY CONSIDERATIONS

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

ADDITIONAL RESOURCES

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

NACE International, www.nace.org

The Protective Coating User's Handbook, Dr. Louis D. Vincent, 2004. Houston, TX: NACE Press.

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 105 hours are suggested to cover *Coating Application*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to performance tasks, the proficiency of the trainees may be noted during these exercises for performance testing purposes.

Topic	**Planned Time**
Sessions I-IV. Introduction; Application Methods	
A. Introduction	_____
B. Manual Methods	_____
C. Spray Methods	_____
D. Production Methods	_____
Sessions V-VI. Coating Specifications; Environmental Conditions; Coating Material Preparation; PDS; PPE	
A. Typical Coating Specification	_____
B. Environmental Conditions	_____
C. Coating Material Preparation	_____
D. Product Data Sheets	_____
E. Personal Protective Equipment; Respiratory Protection	_____
Sessions VII-X. Mixing Coatings, Part One	
A. Mixing Guidelines	_____
B. Essential Terms	_____
C. Single-Component Coatings	_____
D. Plural-Component Liquid Coatings	_____
E. Liquid Coatings with a Powder Component	_____
F. Laboratory Have trainees practice mixing coatings. This laboratory corresponds to Performance Task 2.	_____

Sessions XI-XIII. Mixing Coatings, Part Two

A. Mixing Equipment _____

1. Laboratory _____

Have trainees practice operating and maintaining mixing blades and equipment. This laboratory corresponds to Performance Task 1.

B. Straining and Thinning Guidelines _____

1. Laboratory _____

Have trainees practice filtering and straining mixed coatings. This laboratory corresponds to Performance Task 3.

Sessions XIV-XVI. Wet Film Thickness Measurement and Calculations

A. Wet Film Thickness _____

1. Laboratory _____

Have trainees practice using and maintaining a WFT gauge, measuring WFT, and calculating DFT. Also have them calculate the WFT required based on the specified DFT. This laboratory corresponds to Performance Tasks 7 and 8.

B. How WFT Affects Coating Application _____

Sessions XVII-XVIII. Protective Coverings

A. Sheeting and Drop Cloths _____

B. Tapes and Taping Guidelines _____

C. Tape Application _____

Sessions XIX-XXV. Hand Application of Coatings

A. Brush _____

B. Roller _____

C. Mitt _____

D. Trowel and Squeegee _____

E. Laboratory _____

Have trainees practice brush, roller, mitt, trowel, and squeegee application techniques. This laboratory corresponds to Performance Task 4.

Sessions XXVI-XXX. Spray Application of Coatings; Production Application

A. Spray Application Systems _____

B. Spray Guns _____

C. HVLP _____

D. Airless Spray _____

E. Air-Assisted Airless Spray _____

F. Troubleshooting Spray Application Systems _____

G. Laboratory _____

Have trainees practice application techniques using air, airless, air-assisted airless, and HVLP spray equipment. This laboratory corresponds to Performance Task 5.

H. Production Methods of Application _____

Sessions XXXI-XXXV. Application of Specialty Coatings

A. Plural Component Spray Systems _____

B. Electrostatic Spray Systems _____

C. Powder Coating Spray Systems _____

D. Thermal Spray Systems _____

E. Flame, Arc, Plasma, HP/HVOF, and Gas Detonation Spray Systems _____

F. Hot Spray Systems _____

Sessions XXXVI-XXXVII. Application Issues; Film Curing

A. Holidays and Pinholes _____
B. Film Drying and Curing _____
C. Curing and Recoating Issues _____

Sessions XXXVIII-XL. Equipment Cleanup and Breakdown; Quality Control

A. Manual Equipment Cleaning _____
B. Spray Equipment Cleaning _____
C. Solvent and Non-Solvent Cleaners _____
D. Quality Control _____
E. Coating of Concrete _____

Sessions XLI-XLII. Review and Testing

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

Health and Safety, Debris Management, Containment, and Ventilation
Annotated Instructor's Guide

Module 69105-09

MODULE OVERVIEW

This module addresses the health and safety concerns of industrial coating and lining application specialists. It describes some common containment methods, and explains the use of ventilation systems. It also describes equipment used to monitor the air for environmental protection and worker safety. These systems are required in order to comply with federal and state laws controlling work safety standards and environmental emissions.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*, Modules 00101-04 and 00106-04; and *Industrial Coating and Lining Application Specialist Level One*, Modules 69101-09 through 69104-09.

OBJECTIVES

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

1. Describe the required personal protective equipment (PPE).
2. List the reasons and methods for containment, ventilation, and dehumidification.
3. Name the industry standards for containment and ventilation.
4. Name containment classes.
5. List methods to verify containment effectiveness.
6. List consequences of containment failure.
7. List and demonstrate safety procedures associated with disturbing coatings containing toxic materials.
8. Discuss methods to stay safe while working in a containment area.

PERFORMANCE TASK

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

1. Select the appropriate PPE for a given application.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment, including Tyvex® suits

Samples of containment materials

MSDSs, including an MSDS for a common solvent

Examples of different types of respirators

Cartridges for air-purifying respirators

Industry standards, including *SSPC Technology Guide No. 6*

Shaving cream or spray foam

Decontamination tools

Small pool

Brushes

Laboratory results from containment effectiveness testing

OSHA Safety and Health Standards for the Construction Industry

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

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

ADDITIONAL RESOURCES

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

Preventing Lead Poisoning in Construction Workers, NIOSH ALERT: April 1992 DHHS (NIOSH) Publication No. 91-116a.

The Paint and Coatings Resource Center (PCRC), www.paintcenter.org

Occupational Safety and Health Standard 1910.1025, Toxic and Hazardous Substances, Appendix A Substance Data Sheet for Occupational Exposure to Lead. Occupational Safety and Health Administration.

Coating Inspector Program© Level 1 NACE International, 2003, January 2007.

United States Environmental Protection Agency (7404), EPA Fact Sheet EPA-747-F-98-006, December 1998.

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 47½ hours are suggested to cover *Health and Safety, Debris Management, Containment, and Ventilation*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to performance tasks, the proficiency of the trainees may be noted during these exercises for performance testing purposes.

Topic	**Planned Time**
Sessions I and II. Introduction; Personal Protective Equipment	
A. Introduction	_____
B. Personal Protective Equipment (PPE)	_____
1. Hard Hats	_____
2. Eye and Face Protection	_____
3. Fall Protection	_____
4. Gloves	_____
5. Safety Shoes	_____
6. Hearing Protection	
C. Laboratory Have trainees select the appropriate PPE for a given application. This laboratory corresponds to Performance Task 1.	_____
Session III. Respiratory Protection	_____
Session IV. Water Cleaning Safety	_____
Session V. Confined Spaces	_____
Sessions VI-VIII. Decontamination; HazCom; Federal Law and Industry Standards	
A. Decontamination	_____
B. Hazard Communication	_____
C. Standards and Regulations	_____

Sessions IX-XIII. Surface Preparation; Debris Collection; Containment Classes

A. Surface Preparation Methods _____

B. Debris Collection Methods _____

C. Containment System Classes _____

Session XIV. Containment Enclosure Components _____

Session XV. Containment Ventilation System Components _____

Session XVI. Containment Effectiveness _____

Sessions XVII-XIX. Containment Failure; Hazardous Debris; Lead Poisoning; Review and Testing

A. Containment Failure and Hazardous Debris _____

B. Lead Poisoning _____

C. Review _____

D. Module Examination _____

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

E. Performance Testing _____

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