An Introduction to HIGH-PERFORMANCE COATING SYSTEMS
Course Overview

This CEU will increase your general awareness of not only what high-performance coatings are and where they are used but also factors that influence performance, service life, and selection.
Learning Objectives

Upon completing this course, you should be able to:

• Explain the purpose and common applications of high-performance coatings.

• Discuss how high-performance coatings help control corrosion.

• Describe the benefits of a three-coat system.

• Identify the factors that influence the coating-system selection.
SECTION 1
Basic Principles of High-Performance Coatings
The Big Picture of High-Performance Coatings

Protection | Performance | Aesthetics
SECTION 2
Why High-Performance Coatings Are Used
Why Are High-Performance Coatings Used?

• Protect substrate from corrosion
• Provide resistance to chemical and abrasion
• Ensure durability and safety
• Improve appearance
What Is Corrosion?

Corrosion is the deterioration of a material (primarily metals).
Metallic Corrosion

- Four components are required for corrosion to occur:
  - **Anode**: an “active” metal component
  - **Cathode**: a less-active metal component
  - **Metallic Pathway**: a direct connection between the anode and cathode
  - **Electrolyte**: a medium that conducts electricity, like water
Metallic Corrosion

• Metal expands up to 23 times original size

• High-performance coatings control corrosion
Corrosion Rate

- Several factors influence corrosion
  - Chemicals
  - Temperature
  - Moisture
  - Substrate Design
High-Performance Coatings: Corrosion Control

- Barrier between substrate and water
- Insulates the substrate from contact with soil
- Protects substrate from contact with chemicals
SECTION 3
Where High-Performance Coatings Are Used
Industrial Project

Structures exposed to harsh environmental conditions
Non-Industrial Project
High-performance coatings are not limited to industrial purposes.
Construction Materials

Steel → Concrete, Cement, Masonry → Drywall
Steel

Creates a durable barrier between the metal and service environment
Concrete, Cement, & Brick Masonry

Protection from potentially damaging environment
Drywall

Enhanced durability, resistant to harsh chemicals, abrasion, and marring
What other types of spaces and structures require exceptional durability?
Non-Industrial Projects

- Hospitals and health-care facilities
- Restaurants, hotels, and retailers
Non-Industrial Projects

- Abrasion and chemical resistance
- Corrosion protection
- Exceptional durability
Non-Industrial Projects

• Sporting arenas and ballparks
• Areas with expanses of flooring and handrails
• Wear and tear of construction equipment
• Heavy machinery
• Lift tires, oil fuel, and material spills
Building Maintenance & Facilities Room

- Tanks and pipes
- Color coding
SECTION 4
Surface Preparation
Surface preparation is a result not a process.
Surface Preparation

Ninety percent of premature coating failures are a result of improper surface preparation.
Surface Preparation

Techniques vary based on:
- Coating
- Service environment
Surface Preparation and Priming Standards

- Industry standards
- Technical publications
- Training and certification

SSPC
The Society for Protective Coatings

NACE
The Worldwide Corrosion Authority
SECTION 5
Three-Coat System
Three-Coat System

- Number of coats is more important than thickness
- Protection in layers
Three-Coat System

- Surface profile should be buried by the dry film of primer
- Insufficient coating results in pinpoint rusting

Pin Holes in Coatings

Finish Coat
Intermediate Primer
Substrate

Pinpoint rusting
Three-Coat System: Primers

- Adhere to the surface and resist corrosion
- Different substrates require different primers
- Primers are effective on properly prepared surface
Three-Coat System: Intermediate

- Intermediate layers offer more protection
- Additional coats protect against pinholes
Three-Coat System: Finish Coat

- Provides additional protection
- Improve abrasion resistance
- Aesthetics
SECTION 6
Top Down and Bottom Up
Top-Down & Bottom-Up Approaches

Top-Down Coating Goal

Bottom-Up Substrate

Aesthetics
Service/operational environment

Type of prep
Substrate requirements
SECTION 7
High-Performance Single-Component and Dual-Component Formulas
High-Performance Finish Coats

Single-component coatings

Dual-component coatings
Single-Component Coatings

- Designed to meet a unique need or purpose
- Broad selection of colors and glosses, easy to apply
- Hard and durable, chemical resistant
Dual-Component Coatings

Dual-component coatings

- Consist of an “A” and a “B” portion (chemical reaction)
- Harder and more durable than a single-component product
- UV, chemical, corrosion, and abrasion resistant and water immersible
SECTION 8
Factors that Influence the Choice of High-Performance Coatings
Environmental & Operations Conditions

• Interior and exterior spaces
  – Interior spaces: heat, high humidity, and particulate matter
  – Exterior spaces: freeze-thaw conditions, heat and humidity, UV exposure, salt
Environmental & Operations Conditions

- Environmental conditions
- Healthy indoor environments for occupants
- Occupied spaces vs. new construction
Factors that Influence the Choice of a High-Performance Coating System

• Anticipated use and exposure
  ✓ Service environment
  ✓ Expected exposure
  ✓ Job type
  ✓ Substrate type
  ✓ Surface Preparation
  ✓ Budget
  ✓ Customer Expectations
Standards and Specialists

• Rely on standards and specialists
  – Applications and surface preparation standards can mitigate confusion
  – Coating manufacturers are a valuable resource
  – With guidance, projects can be done properly
Summary

At first glance, the world of high-performance coatings may appear overwhelming. But a good starting point for understanding these coatings is to recognize that the same benefits high-performance coatings provide for large-scale industrial projects can be applied to non-industrial projects.

So when exceptional durability, safety, and longevity are needed or required, specify a high-performance coating system. These coatings are designed specifically to protect substrates from chemicals, abrasion, and corrosion and enhance project aesthetics.
Thank you for your interest in high-performance coating systems. This concludes the American Institute of Architects Continuing Education Systems and IDCEC Course.

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Resources

Master Painters Institute
www.paintinfo.com

NACE International
www.nace.org

National Paint & Coatings Association
www.paint.org

Society for Protective Coatings
www.sspc.org

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