When Coatings Fail

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Today’s Agenda

• Coating Failure or Premature Coating Failure?

• Causes of Coating Failures

• Case Study: Industrial Sludge Holding Tank

• I have a Coating Failure, Now What?

• How to Avoid Coating Failures
Coating Failure or Premature Coating Failure?

• All coatings fail over time because they are permeable and deteriorate over time with exposure to their environment.

• A premature coating failure is a coating that does not protect the substrate from its environment for its intended service life.
Causes of Coating Failures

- Contractor Error, approx. 75% of cases
- Specification Problem, approx. 15% of cases
- Unintended Service Condition, approx. 7% of cases
- Problems in the Material Manufacturing Process, approx. 3% of cases
Contractor Error

- Insufficient Surface Preparation
- Improper Mixing
- Improper Application
- Contamination
- Ambient Conditions Outside What is Required
- Reccoat Windows Not Adhered To
- Improper Coating Thickness
- Improper Material Storage
Insufficient Surface Preparation
Improper Mixing
Improper Application
Contamination
Ambient Conditions Outside of What is Required
Recoat Window Not Adhered To
Improper Coating Thickness
Improper Material Storage

• Skinning and hardening

Caused by:

– Paint stored improperly
– Containers opened, then improperly resealed
– Affected by environmental conditions such as rain, heat, cold, etc.
Specification Problems

• No Specification
• Improper Material Selection
• Poor Structural Design Not Address
• Specification Conflicts with Manufacturer's Instructions
Unintended Service Conditions
Problems in Material Manufacturing Process

- Very Rare Occurrence—Account for Only 3% of Failure Cases
- Considered After Other Modes of Failure Have Been Ruled Out
Case Study: Industrial Sludge Holding Tank

Case Background

• 250,000 gallon equalization tank for an industrial food processing company.

• A coating applied inside the tank failed after only two years.

• The original contractor attempted to repair the coating without success—some areas had as much as 1” of polyurea coating.
Case Study: Industrial Sludge Holding Tank
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Failure Analysis

• Incorrect Surface Preparation

• Specification Was Non-Existent
Case Study: Industrial Sludge Holding Tank

Steps for Rehabilitation

• Proper specification obtained
• Failing coating removed using UHP water jetting (40,000 psi)
• Dry abrasive blast to SSPC SP-10
• A hold primer was applied at 1-1.5 mils DFT
• An elastomeric polyurethane was applied at 60 mils DFT
Case Study: Industrial Sludge Holding Tank
I Have a Coating Failure, Now What?

• Failure Investigation—Information to Review
  • The Specification
  • Daily Reports from Contractor
    • Ambient Conditions
    • Material Batch Numbers/Data Pages
    • Surface Prep Method
    • Application Method
    • Inspection Reports
I Have a Coating Failure, Now What?

• Site Inspection
  • Where are problems occurring?
  • Compare failed areas with non-failed areas
  • Determine the Type of Failure
    • Primer to Substrate (Pay close attention to the back of the coating if disbonding is the problem)
    • Intermediate Coat to Primer
    • Top Coat to Primer
  • Measure Film Thickness and Surface Profile
  • Take Pictures and Samples
  • Get Third Party Analysis and Testing

• Only after all data is collected and carefully analyzed can conclusions be made.
How to Avoid Coating Failures

• Understand the Project and Critical Points of Failure
• Obtain a Thorough Specification with Proven Materials
• Pre-Qualify Contractors with Qualifications and a Track Record of Success on Similar Projects
• Require a Pre-Job Conference to Set Expectation and Address Potential Problems
• Identify Hold Point Inspections
• Hire a Third Party Inspector
• Require QA/QC Reporting and Daily Reports
• Actively Observe the Jobsite
• Avoid Directing the Contractor as You May Create Liability for Yourself
Questions?