Best Technology Solutions (BTS)

NACE Protective Coatings Techniques& Procedures Training program

Introduction:

This training course thoroughly and systematically covers every aspect of coatings application and inspection techniques, maintenance and repair procedures. Coatings selection, specifications, applications and relevant industry standards for surface preparations of various substrates such as steel, galvanized steel, stainless steel, copper, and aluminum are also discussed in depth. The effect of cathodic protection on the performance of coatings is also covered in detail. This coatings short course trains the participants with the knowledge and skills required for effective coatings inspection, maintenance and repair of both organic coatings (or paints) and metallic coatings such as hot-dip galvanizing and metallic spray or metallization.

Who Should Attend?

Engineers and technologists who are in charge of cathodic protection systems, Designers who are interested in cathodic protection technology for corrosion prevention, Technicians and maintenance personnel who deal with installed cathodic protection systems, Facility owners and users who are concerned with corrosion, Plant Maintenance Engineers and Supervisors, Materials Engineers, Design, Manufacturing, Mechanical and Inspection Engineers, Quality Assurance/Control Personnel, Chemical Treatment Personnel, Protective Coating and Lining Personnel

Course Objectives:

By the end of this course delegates will learn about:

- The Role of a Coating Inspector
- Corrosion Concepts Relevant to Coatings
- BS, ISO Classification of Corrosive
- Environments
- Characteristics of Coatings
- Fundamentals of Coatings
- The Protective Coating System
- Corrosion Resistant Organic Coatings
- Corrosion Resistant Zinc Coatings
- Design Considerations
- Effect of Substrate on Coating Life
- Importance of Surface Preparation
- BS, ISO, SIS, NACE, SSPC Standards
- Relevant to Surface Preparation
- Application of Coatings
- Health and Safety Aspects
- Selection of Coatings
- Coatings and Cathodic Protection
- Coating Failures: Causes and Prevention
- Coating Repair and Maintenance
- Development of Specifications
- Quality Control in Coatings Application
- Coatings Inspection and Testing
- Glossary of Technical Terms in Coatings and Corrosion

Course Outline:

The Role of a Coating Inspector

- The Basic Requirements of A Coating Inspector
- Types of Coatings Inspectors
- The Roles of Coating Inspectors
- Accountability of A Coating Inspector
- Coatings Inspection Requirements
- Case studies on coatings-related disputes resulting arbitrations and litigations

Corrosion Concepts Relevant to Coatings

- Definition and classification of corrosion
- Various forms of corrosion and its control
- The need for coatings
- Major factors influencing corrosion and the durability of coatings

BS & ISO Classification of Corrosive Environments

- British standard (BS) and International standard (ISO)
- The duration of corrosion: Time of wetness (ToW)
- Coatings for protection of corrosion in atmospheres
- Coatings for protection of corrosion in water and soil
- Coatings for corrosion protection: special situations and special stresses

Characteristics of Coatings

- Physical barrier and special functions of coatings
- Essential coating properties
- Inhibitive primers
- Importance of moisture vapor transfer rate (M.V.T.) of various coatings

- MVT and coating blistering
- Osmosis and osmotic blistering: causes and prevention
- Electroendosmosis: causes and prevention

Fundamentals of Coatings

- ISO standard: definitions of coatings, paints and lining
- Basic components of coatings
- Functions of pigment, binder and solvent in a coating system
- General functions of each coat: primer, intermediate coat and top coat
- Mechanisms of protection
- Common coatings and their compositions

The Protective Coating System

- ISO standard definition of terms: pot life, shelf life, DFT, NDFT, VOC, tie coat, stripe coat etc.
- Different types of paint
- ISO paint durability classification
- ISO durability vs guarantee time
- Shop and site application: advantages and disadvantages

Corrosion Resistant Organic Coatings

- Protective coatings classification
- Mechanisms of curing
- Natural-air oxidizing coatings
- Synthetic-air oxidizing coatings
- Solvent dry lacquers
- Coreactive coatings
- Emulsion type coatings

- Heat-condensing coatings
- 100% solid coatings

Corrosion Resistant Zinc Coatings: zinc-rich coatings vs. hot-dip galvanizing

- Zinc and its sacrificial protection to steel substrate
- Organic zinc-rich coatings and its properties
- Inorganic zinc-rich coatings and its properties
- Organic zinc-rich vs. Inorganic zinc-rich coatings
- Hot-dip galvanizing and hot-dip galvanized zinc coatings
- Zinc-rich paint vs. hot-dip galvanizing: When and Where to use them

Designing for Coatings

- Basic design criteria for corrosion protection purposes
- Accessibility, Treatment of gaps, Precautions to prevent retention of deposits and water
- Edges, Welding surface imperfections, Bolted connections, Box members and hollow components
- Notches, Stiffeners, Prevention of galvanic corrosion, Handling, transport and erection

Effect of Substrate on Coating Life

- The Importance of Surface Cleanliness: "visually clean" vs "chemically clean"
- The Substrate Effect & Coating Life
- Types of Substrates: Steel, Galvanized steel, Stainless steel, Aluminium, Wood & Concrete etc.
- Millscale and its effect on a coating's performance
- Surface contaminants: moisture contamination
- Surface contaminants: water-soluble salts and osmotic blistering
- ISO standard on acceptable chloride levels on sandblasted surfaces

- Surface contaminants: oil and grease
- Other surface contaminants: fungal/algal growth and efflorescence

Importance of Surface Preparation

- BS, ISO, SIS, NACE and SSPC Standards on Surface Preparation
- Hand Tool Cleaning
- Mechanical or Power Tool Cleaning
- Solvent Cleaning/Degreasing Acid Pickling
- Abrasive Blast Cleaning
- High Pressure Water Jetting
- Flame Cleaning

BS, ISO, SIS, NACE, SSPC Standards Relevant to Surface Preparation

- Rust Grades and Preparation Grades
- ISO, Swedish and British Standards on Surface Preparation
- ISO Standard on Localized Surface Preparation of Previously Painted Steel
- Inspection and Verification of Surface Preparation
- Procedure for the visual assessment of steel substrates
- Water jetting standard and the various flash rust grades
- Interpretation of the various blasting grades: Sa2, Sa2½, Sa3, PMa, PSa2& PSa2½.
- ISO surface preparation standard for localized repair

Methods of Application

- Brush application
- Roller application
- Conventional air spray
- Airless spray
- Conventional spray vs Airless spray: advantages and disadvantages
- Electrostatic spray
- Other methods of application

Health and Safety Aspects

- MSDS and Product Data Sheet Review
- Flash point classification
- Fire Hazard and Fire Fighting Measures
- Hazardous ingredients
- General Precautions and First Aid

Selection of Coatings

- Factors influencing coatings selection
- The process of coatings selection
- High chemical resistant coatings
- Moderate chemical resistant coatings
- Low chemical resistant coatings
- High temperature resistant coatings
- Special: zinc-rich coatings

Coatings and Cathodic Protection

- How coatings protect steels from corrosion
- How cathodic protection works
- Coating failures induced by cathodic protection
- Coatings suitable for use with cathodic protection systems
- The economic aspect of specifying coatings with cathodic protection
- Cathodic protection criteria safe for coatings
- Laboratory and field test methods

Coating Failures: Causes and Prevention

- Case studies: Arbitration & Litigation cases arising from coating failures
- Who pays when a coating fails
- The breakdown of coating failures
- Incorrect coatings specifications
- Application errors
- Change in environment from original design criteria
- Faulty paints
- Common coating failures: causes and prevention
- What the owner, applicator and supplier can do to minimize the risk of coating failures

Coating Repair and Maintenance

- The need for coating maintenance and repair
- The timing of coating repair: WHEN to initiate a repair job
- Inspection to determine the extent of coating failure: ISO, ASTM, SSPC& European standards
- Standard Methods of Evaluating Degree of Rusting on Painted Steel Surfaces
- Repair procedure: ISO Standard
- Repair of common coating failures such as delamination, blistering, pinpoint rusting, chalking, etc.

Development of Coatings Specifications

- Development of specifications
- Project specification
- Coatings specification
- Coatings work specification
- Inspection and assessment specification
- How to develop coatings specification for new work

- How to develop coatings specification for maintenance
- Contents of a specification
- Sample specifications for new work, maintenance and inspection

Quality Control in Coatings Application

- The needs for quality control in coatings application
- Factors to be considered in quality control
- Variables involved in quality control
- Weather conditions
- Dehumidification
- In-process quality control

Coatings Inspection and Testing

- The needs for inspection and testing
- Relevant international standards applicable to coatings inspection and testing
- The inspection requirements
- Preparation for inspection
- Laboratory and field test methods for surface cleanliness (water-soluble salts) after sandblasting
- Inspection and measurement of surface profile after sandblasting
- Measurement of Ambient Conditions & Environmental Test Instruments
- Non-destructive Testing and Inspection
- Non-destructive Testing Instruments
- Use of Inspection Procedures for Both Destructive and Non-destructive Test Instruments
- Laboratory Instruments and Test Methods
- Measurements of wet film thickness (WFT) and dry film thickness (DFT)
- Holiday detection
- Single coat vs. multi coat
- Inspection Procedures
- Documentation and Logbook
- Inspection Checklist