Inspection of
Bridge Painting &
Re-Painting
New Structural Steel

- **Shop Painted**
  - Primary System
    - Inorganic Zinc Primer
    - Polyurethane Top Coat
  - County Secondary
    - Alkyd Paint System
Delivery to the Project

- Overall Condition
- Damaged Areas
- Missed Areas
- Runs and Sags
- Dry Film Thickness
Overall Condition

- Look for signs of:
  - unevenness
  - Mudcracking
  - blistering
  - peeling
  - soft-to-touch or tacky
Damaged Areas

- Observe Handling to Minimize Damage
  - Slings for unloading
  - Wood or padded blocking for temporary support

- Look for and document any nicks or scratches.
  - Observe Repair
Missed Areas

- Look for and Document Any Area Missed
  - inaccessible areas

- Observe Repair
Runs and Sags

- Look for and Document Areas of Excessive Running or Sagging
  - Small isolated areas acceptable
  - Large areas indicate improper application
    - Contact Bridge Construction Engineer if large areas are encountered
Dry Film Thickness

- Thickness of Paint After Cured
- Shop Inspected Items Are Checked at Fabrication Plant
- Verify Shop Inspection with Bridge Construction Engineer
- Items not Shop Inspected Should be Inspected on Project
Field Touch-Up & Repair

- Touch-Up Should be Done After Any Work that May Further Damage Paint.
  - Deck Pour
  - Falsework Removal
Field Touch-Up & Repair

- **Damaged Areas**
  - Aluminum Filled Epoxy Mastic Primer
  - Polyurethane Top Coat

- **Faying Surfaces**
  - Polyurethane Top Coat
    - Shop Primed
Field Touch-Up & Repair

- Touch-Up Paint
  - Supplied with the Steel
  - From Same Supplier as Shop Paint
  - Primer/Top Coat from Same Manufacturer
    - From Approved List
Bridge Repainting

- Spot Repair vs. Total Repainting
- Removal of Existing Paint
- Pre-Surface Preparation
- Surface Preparation
- Coating Application
- Final Inspection
Type of Project

- **Spot Repair**
  - Girder End Modification
  - Work Affected Areas
  - Damage Repair
  - Rail Retrofit

- **Total Repainting**
  - Deck Replacement
  - Paint System Failure
  - Aesthetics
Removal of Existing Paint

- Proper Containment of Lead Based Paint Residue is **REQUIRED BY LAW**.

  - < 220 lbs. Paint Residue may be disposed of in permitted landfill
  - > 220 lbs. Paint Residue is considered hazardous material if > .05 mg/l leachable lead
Paint Residue

- Paint Residue is considered to be the combination of:
  - Paint Chips
  - Blasting Media
  - Any other debris picked up with or added to above.
Bridge Repainting Classifications

- **Class I**
  - Spot Repair
  - Power Tool Cleaning (SSPC SP3)
    - Shrouded
    - Vacuum Pickup
  - < 220 lbs. Residue

- **Class II**
  - Total Repainting
  - Abrasive Blast Cleaning (SSPC SP6)
    - Complete Removal
    - 15% Blastox by Weight
  - > 220 lbs. Residue
Containment and Collection

- “Best Management Practices” required to be used.
- Containment Plan submitted & approved.
- Residue stored in sealed 55 gallon drums.
- Drum(s) handled as hazardous until tested.
- Drums stored in secure location.

- 55 Gallon Drums must:
  - be new or meet EPA definition of a reusable container.
  - Must never have previously contained petroleum products
Containment and Collection
Class I

- Shrouded Vacuum Power Tools
- Contractor Must Collect and Weigh Residue
  - Collect only paint residue
  - Have Contractor furnish weigh ticket
- Store in Approved 55 Gallon Drums
- Disposal by Department
  - < 220 lbs. - Dispose at permitted landfill
  - > 220 lbs. - Immediately notify Bridge Construction Engineer.
Containment and Collection
Class II & III

- Contractor Must Contain and Collect Residue.
- Store in Approved 55 Gallon Drums.
- Representative Sample from 1st 55 Gallon Drum.
  - Notify Bridge Construction Engineer when sample is attained.
  - Bridge Construction Engineer will send out “Chain of Custody Record.”
  - Send sample and Chain of Custody record to Bridge Construction Engineer for testing.
- Store in Secure Location Until Further Notified.
Responsibility

**Contractor**
- Perform work to specifications.
- Be knowledgeable of and comply with law.
  - OSHA
  - EPA

**Department**
- Monitor Contractor’s work to assure compliance with specification/laws
- Is owner of any hazardous material.
- Disposal of Residue
Pre-Surface Preparation Inspection

- Contractor’s Equipment
- Paint Materials
- Abrasive Blasting Media
- Ambient Conditions
Contractor’s Equipment

- Contractor Responsible for Selection of Type and Size of Equipment.
- Inspector Needs to Assure Equipment Properly Functioning
  - No Contamination (oil, water, etc.)
  - Moisture traps
  - Oil separators
  - Blotter Test
Blotter Test (ASTM Practice 4285)

- Shut Off Flow of Abrasive.
- White Blotter Paper or Other Suitable White Absorbent Material 24 Inches from Outlet
- Allow Free Air Flow for 2 Minutes
- Visible Contaminants Require Corrective Action.
Paint Materials

- Approved List or Otherwise Specified.
  - All components from:
    - Same manufacturer
    - Otherwise specified by manufacturer (Thinners)
    - Proper Color

- Technical Data Sheets
- Proper Storage
- Undamaged Unopened Containers
Abrasive Blasting Media

- Typically Sand or Coal Slag
  - Sand not allowed for Class III
- Abrasive should be free of clay and other contaminants
- Blastox
  - Assure Blastox was added in proper amount
  - Make sure uniformly blended
  - Certificate of Compliance if pre-blended
Surface Preparation Inspection

- Surface Preparation Provides for Proper Paint Adhesion by:
  - Cleaning Substrate
  - Providing Surface Roughness (Anchor Pattern)

- Consists Primarily of:
  - Solvent Cleaning
  - Power Tool Cleaning
  - Abrasive Blast Cleaning
Solvent Cleaning (SSPS SP1)

- Required to Removal All Visible Oil, Grease, and Other Soluble Contaminants.
  - Coating will not adhere to surface with oil or grease
  - Abrasive Blasting will drive grease or oil into pores of steel.

- Closely Inspect All Surfaces for Visible Contamination.

- Notify Contractor of Contaminated Areas.
Power Tool Cleaning (SSPC SP3)

- Power Assisted Hand Tools
- Remove All Loose Mill Scale, Loose Rust, Loose Paint, and Other Loose Foreign Material
  - Not intended to remove tightly adherent mill scale, rust, or paint.
- Typically Used for Spot Repair
Abrasive Blast Cleaning

- Required for Removal of:
  - Existing Paint
  - Rust
  - Mill Scale

- Required to Attain Proper Anchor Pattern
Abrasive Blast Cleaning

- Compressed Air Cleanliness (Blotter Test)
- Blasting Pressure
- Determine Degree of Cleaning Specified
  - Usually SSPC SP6 - Commercial Blast Cleaning
    - No Visible Contaminants W/O Magnification
    - Minor Discoloration (Staining) on No More Than 33% of Surface.
    - Use 3 ft. X Full Web Depth Test Sect. and SSPC-VIS 1 (Visual Standard for Abrasive Blast Cleaned Steel)
Use of SSPC-VIS 1 (Visual Standard for Abrasive Blast Cleaned Steel)

- Determine Initial Grade of Rust Prior to Surface Preparation.
- Determine Specified Degree of Cleaning
- From Table-1, Determine Which Visual Standard to Use.

Note: Visual Std’s. are only a guide. Specified degree of cleaning governs.
Anchor Pattern (Surface Profile)

- Specifications Require 1 to 3 mils
  - If max. surface profile of 3 mils cannot be maintained, increase coating thickness accordingly.

- Surface Comparator
- Testex Tape

- To Achieve Anchor Pattern, Contractor May Need to Change:
  - Abrasive Size
  - Abrasive Type
  - Blasting Pressure
Surface Comparator

- Placed on prepared surface
- 5X to 10X Magnification
- Anchor profile is determined, based on a comparison between comparator & surface,
Testex Tape (Film)

- Equipment:
  - Micrometer
  - Testex Tape (Film)
    - 0 to 2 mils (Coarse)
    - 1.5 to 4.5 mils X-Coarse
  - Burnishing Tool
Testex Tape

PROCEDURE

- Clean/Calibrate Micrometer to Zero
- Prepare Tape
  - Remove Backing
  - Inspect for damage
- Measure Thickness
  - Pre-measured thickness is max. profile height tape should be used for.

- Place Tape on Steel & Rub With Burnishing Tool
- Measure Tape Thickness
  Profile = Reading - 2 mils
  - If Profile is close to or exceeds pre-measured value, retest with different tape.
Inspection of Coating Application

- Time Restraints
- Ambient Conditions
- Mixing & Thinning Paint
- Application Methods
- Coating Thickness
Time Restraints

- Steel Must be Primed Within 24 Hours of Surface Preparation.
- Follow Manufacturer’s Recommendations From Product Data Sheet for:
  - Induction Time (Time between mixing and appl.)
  - Pot Life
  - Cure Time Between Coats
Ambient Conditions

- **Specification Requirements**
  - Manufacturer’s Recommendation or Standard Specifications, Whichever is More Stringent.

- **Temp. of Paint, Steel, & Air**
  - Between 40°F and 90°F

- **Steel Temp. ≥ 5°F Above Dew Point**

- **Relative Humidity < 85%**
Temperature

- Coating Materials Should be Stored to Attain Proper Temp.

- Steel Temperature
  - Magnetic Surface Thermometer
  - At Exact Location of painting
  - Not in Direct Sunlight
Psychrometer

- **Measures:**
  - Ambient Air Temp.
  - Relative Humidity
  - Dew Point

**Instructions**

- Saturate cotton with water
- Swing apparatus several times
- Record temperature
- Repeat until no change in readings
- Use Table or Graph for Rel. Humidity & Dew Point
- Ambient Air Temp. = Dry Bulb Therm. Reading
Mixing Paint

- Proper Mixing Is Important To Assure Consistency
- Mixing in accordance with Tech. Data Sheet
- Paint Consists Of:
  - Vehicle
  - Solids
- Vehicle and Solids Must Be Thoroughly Mixed
Thinning

- Thin Paint Materials:
  - Only when absolutely necessary
  - In accordance with manufacturer’s technical data sheet
  - Only with the proper thinners

*(Wrong Thinner or Too Much Thinner is Detrimental to Coating)*
Paint Application

- **Stripe Coating**
  - Edges, Corners, Bolt Heads, Nuts, Etc. Shall be coated prior to application of primer and top coats.
  - Typically done by brush
    - Roller or Mitts may be allowed, but coating thickness should be closely monitored.
    - Spray application of stripe coat is not allowed.
Application Methods

- Conventional Spray
- Airless Spray
- Brushes
- Rollers
- Mitts
Conventional / Airless Spray

- Contractor Responsible for Equipment Setup / Adjustments
- Inspector Should be Concerned with Painter’s Technique for Application
  - Proper Overlap
  - Sectioning
  - Triggering
  - Inside/Outside Corners
Spray Technique

- Overlap previous pass by approx. 50%
- Large areas should be broken down such that 18 to 38 inch strokes are used
- Spray gun turned off at end of stroke and not turned back on until gun is moving in opposite direction
- Inside/Outside Corners
  - Each Face Separately on Inside Corners
  - Spray Gun Faced Directly at Corner for Outside Corners, then each surface.
Spray Technique

- Proper Spray Technique Should Result in:
  - Proper Thickness
  - No Runs or Sags
  - No Dry Spray
  - No Holidays

- Visual Inspection & Wet/Dry Film Thickness Will Confirm Compliance
Feathering and Spot Painting

- Junction Between Sound Existing Coating and Spot Cleaned Areas Should Present a Smooth, Feathered Appearance.
  - Sand Around Spot Repair *(Feather Edging)*
  - Overlap Existing Coating
  - Note Any Effect New Coating May Have on Existing Coating *(Stop! and Notify Bridge Constr. Engr.)*
    - Bubbling
    - Wrinkling
    - Lifting
Coating Thickness

- **Wet Film Thickness (WFT)**
  - Used only as a guide as to what final dry film thickness will be achieved.

- **Dry Film Thickness (DFT)**
  - Governed by specifications and used for acceptance.
Wet Film Thickness

- Estimate of DFT

\[
W = \frac{D[1.0+T]}{S}
\]

Where:
- \( W = \) WFT is in mils
- \( D = \) DFT is in mils
- \( S = \) % Solids by Volume
- \( T = \) % Volume of Thinner added
Dry Film Thickness

- 5 Spot Measurements Every 100 Sq. Ft.
  - Each spot measurement consists of an average of 3 gage readings
- Acceptable Results
  - Average of 5 spot measurements within specified limits for DFT
  - No spot measurement less than 80% of min. specified
Visual Inspection

Same as Previously Discussed for New Structures: