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

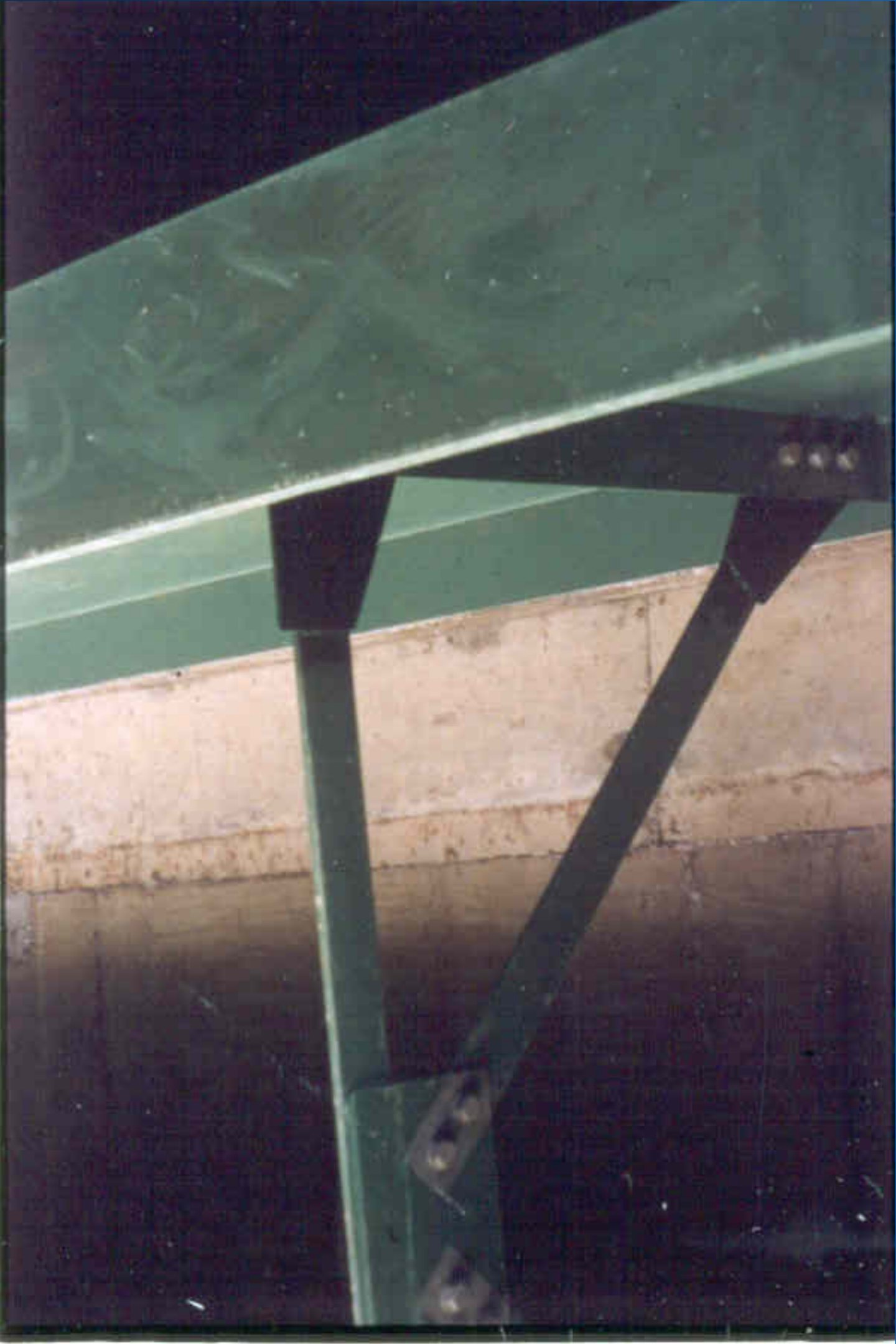
- **Touch-Up Should be Done After Any Work that May Further Damage Paint.**
  - **Deck Pour**
  - **Falsework Removal**

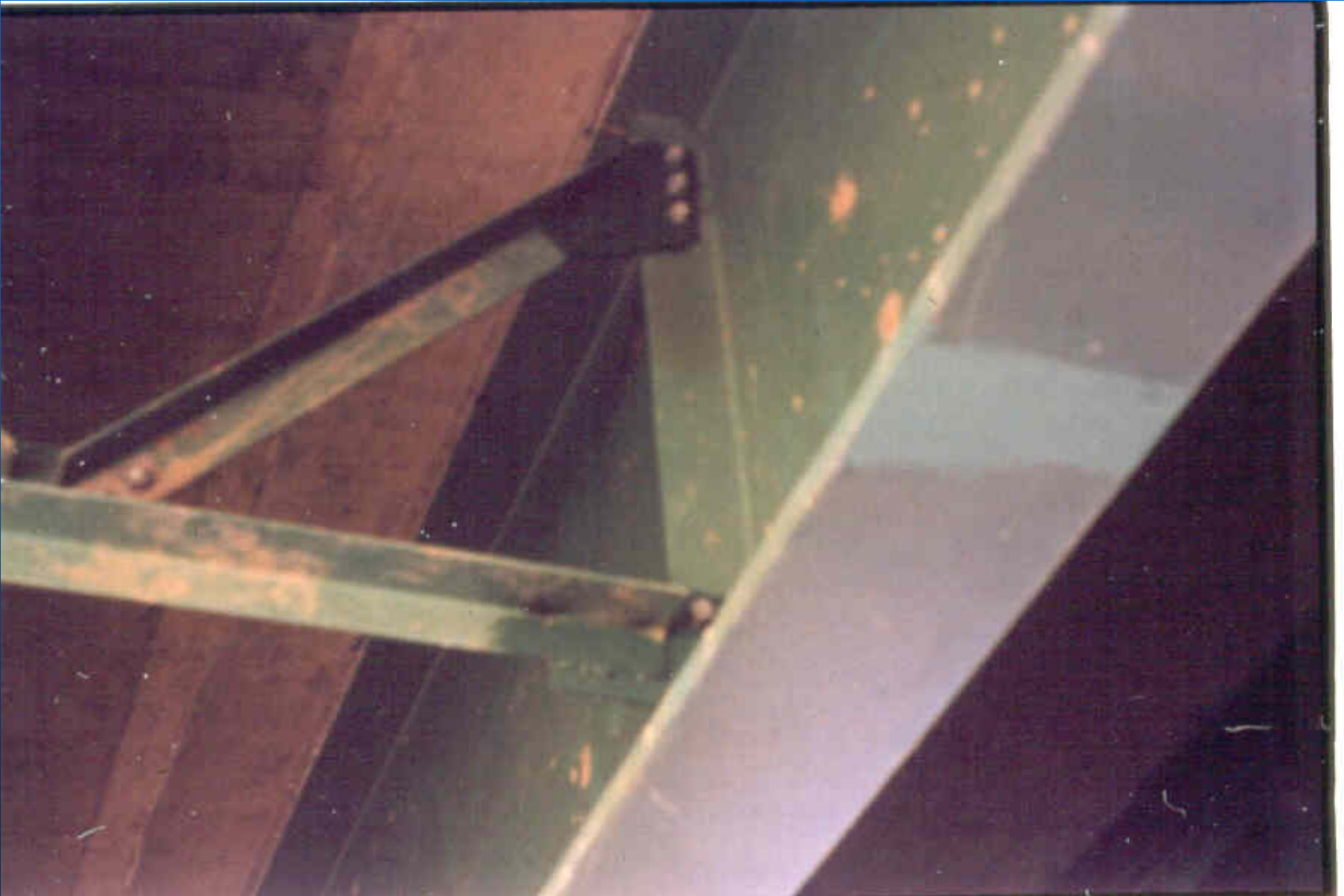
Field Touch-Up & Repair

- **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 <u>REQUIRED BY LAW.</u>**
  - **< 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.

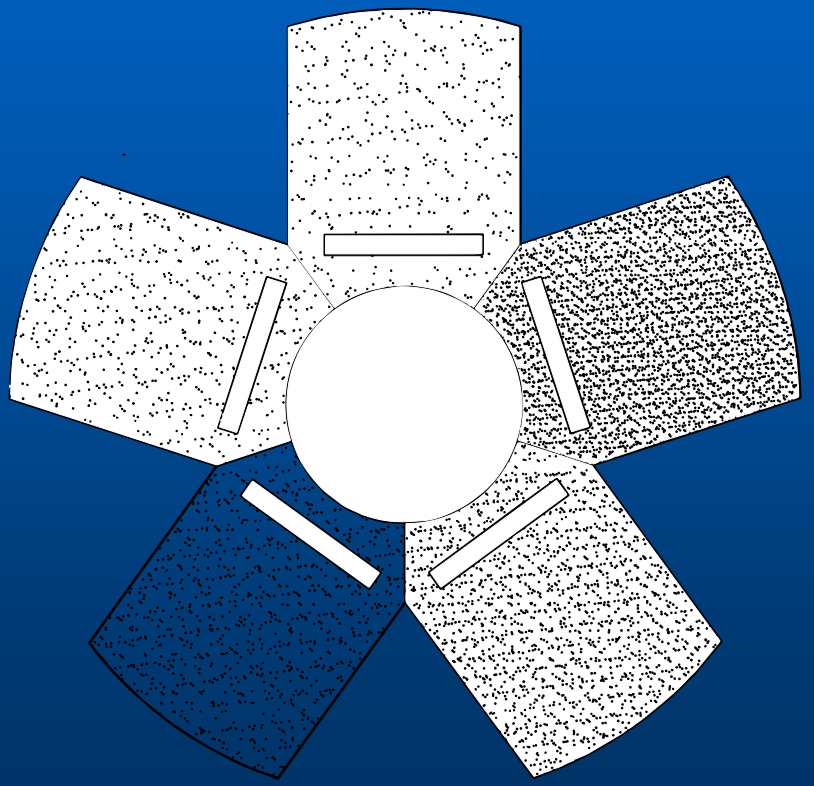
Anchor Pattern (Surface Profile)

- **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

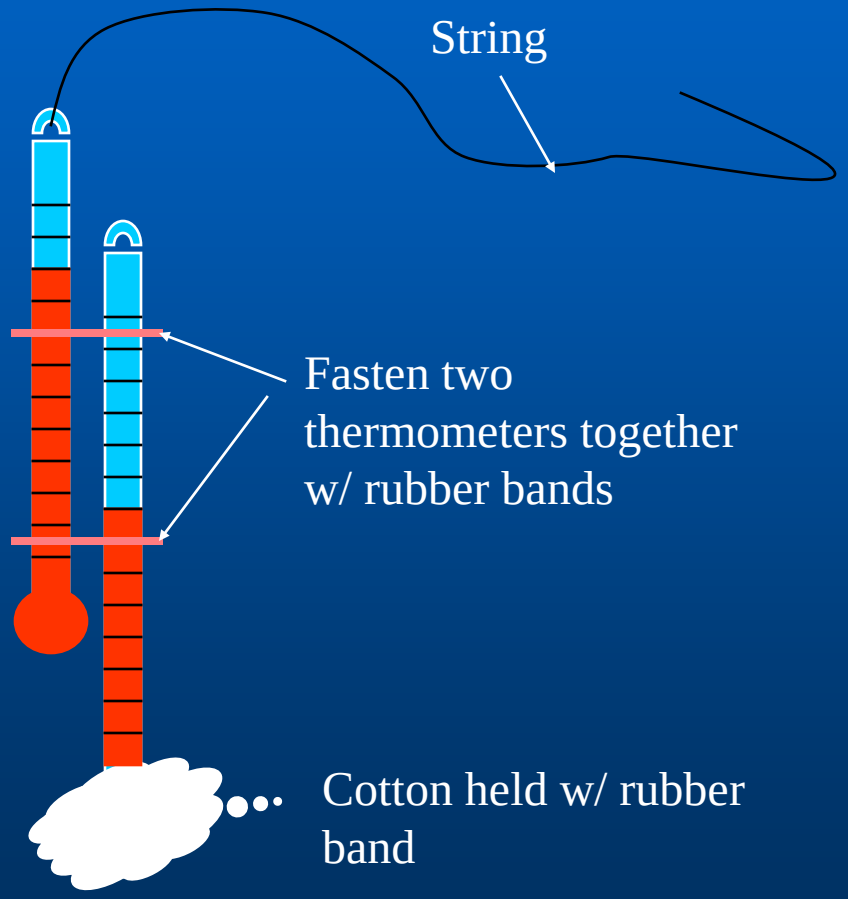
- **Coating Materials Should be Stored to Attain Proper Temp.**
- **Steel Temperature**
  - **Magnetic Surface Thermometer**
  - **At Exact Location of painting**
  - **Not in Direct Sunlight**

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**

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

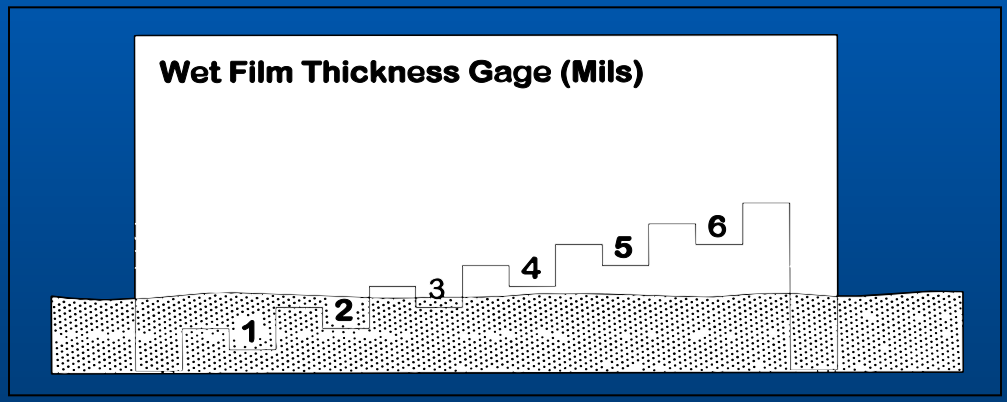
Where:

W = WFT is in mils

D = DFT is in mils

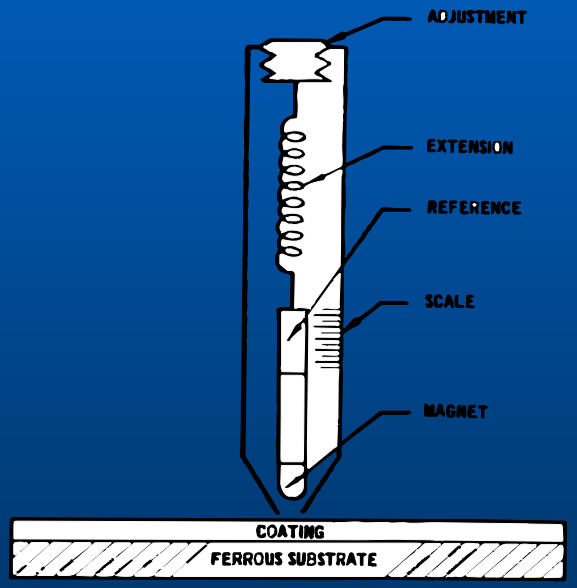
S = % Solids by Volume

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: