Structural Steel: Best Practices of Coatings

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Discussion Topics

- Bridge Coatings Best Practices
- Specifications
- Inspection Value
- Material Testing Value
- Questions / Discussion
Bridge Coating Materials

- Legacy paint systems are no longer an option
- Past research has guided industry material choices
  - Thorough steel cleaning
  - Sacrificial primers
  - Multi-coat systems
  - Not always “paint”
Protective coatings are the predominant method of corrosion control on steel bridges.

The majority of bridges painted prior to 1990 contain lead based paint.

Lead has been associated with serious health problems when exposure reaches certain threshold levels.

Most bridge maintenance projects include removal of lead based paint (Hazardous Waste).
Bridge Coating Best Practices:
- Bridge Coat. Mat'l's
- Exist. Lead Paint
- Coating Mat'l Types
- Current Paint Systems
- Weathering Steel
- Galvanizing
- Metallizing
- Regulations
Current Paint Systems

- Longer lasting systems are the most widely used
- Zinc-Epoxy-Urethane coating system
- Organic vs. Inorganic Zinc Primers
- Moisture Cured Products
- Galvanizing and TSM systems
Weathering Steel

- Corrosion protection through natural oxidation of specific steel alloys
- Patina becomes a more stable surface layer
- Cost effective approach, little or no premium above painted steel
- Should not be used in moist environments, and requires special detailing practices
Weathering Steel

Localized laminar corrosion of weathering steelwork below deck joint (Pre-blast).

Localized area of 100% section loss and deep pitting uncovered during blasting operations. Painting contract has provisions for repair.

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**Galvanizing**
- Hot dipping of steel in molten zinc
- Provides very good corrosion protection
- Limitations as to member length. Current limitations are about 100’
- Cost premium, more costly than weathering steel
- Very effective in areas where weathering steel limitations exist
- Not easy to paint over
Metallizing

- Application of molten zinc or zinc/aluminum mixture through thermal spray or electric arc spray
- Very good corrosion protection
- Cost premium over paint systems, but superior life cycle costs
Clean Air Act - Limits airborne lead emissions.

Clean Water Act - Prohibits any discharge of lead into surface waters of the United States.


Regulations Drive Practices

- Worker protection is required
- Public protection is required
- Waste management is required
  - Waste reduction
  - Waste handling and disposal
Performance Based Specification

- Currently utilized by MassDOT
- Allows for Contractor Innovation
- Requires Performance Evaluation and Thorough Review of Contractor Submittals
- Job Specific Coating Selection

Specifications:
- Performance Based Specification
- New Construction
- Bridge Maintenance
New Bridge Construction Coating Specification

- Current MassDOT Bridge Manual direction:
  1. Weathering Steel (non Marine)
  2. Galvanizing (Marine)
  2A. Metallizing (Marine - large pieces)
  3. Paint (High Maintenance)

- QPL is good starting point, but not end all
- Field touch-up should be addressed
- Top coat in shop or field
Bridge Maintenance Coating Specification

- Hazardous Waste Handling and Storage
- Laydown area should be identified.
- Structural Steel Repairs
  - Bolted Connections
  - Repair Damage
  - Slip Critical Coatings
Inspection

- Contractor typically required to perform QC
- QC Ultimately responsible for quality
- QC Reports direct to management
- Owner typically would provide verification
- Trust but verify
Shop and Field Inspection

- **Shop**
  - Controlled environment
  - Bolt-up/handling damage
  - Field Touch Up
  - Dedicated paint inspector not always provided

- **Field**
  - Lead exposure concerns
  - Many Variables
    - Weather
    - Inaccessible areas
    - Other work
    - Ex. steel condition
  - Dedicated paint inspector typically provided
Cost of Inspection

- Cost of QC Inspection is negligible
- Cost of Inspection is 10-20% of construction

Value of Quality Assurance:
  - Sense of contractor responsibility for quality
  - Reassurance in investment
  - Reduce future maintenance
  - Accountability of all parties
NEPCOAT List

- Northeast Protective Coatings Committee
- DOT and bridge specific qualified product list
- Multiple lists available, application dependent
- Still need job specifics, not just QPL
- Independent testing and acceptance criteria
- NTPEP process (AASHTO)
Material Certifications

- Various documents available:
  - Letter from Coating Manufacturer
  - Verification of testing
  - Independent test results
  - Certificate of Compliance
Coatings Testing Programs

- Varies State to State
- Manufacturer’s certifications
- Qualified Product List (QPL)
- Sampled and tested per batch
- Field sampled and tested per project
- Random sampling and testing
For Consideration

- What are we testing for?
  - % Solids and Viscosity
  - Some states are doing IRs

- Random sampling
  - Due to batch sizes, one sample per batch is not always representative.
  - Replace testing with Material Certs.
  - Random samples pulled from job sites, retained, and independently tested
In Summary

- Best Coating Materials
  - Weathering Steel / Galv or Metalizing / Paint
- Best Coating Project Specifications
  - Job Specific Performance Spec
- Best Inspection Practices
  - Independent Verification
- Best Material Testing Practices
  - Independent Test and Field Sample
Questions/Discussion

- Questions
- Comments
- Items for discussion