Challenges of Field Application of Plural Component, Thick-Film Coatings and Linings; Interior and Geotextile Applications

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Application Considerations

- Project submittal work
  - 2 projects, over 1 year each in submittal work
- Travel distance to project
  - Not always in "back yard"
- Site Access / work schedule
  - Getting equipment in place
  - Other trades, location operation
- Installation challenges
  - Environmental and site issues

Polyurea Spray Projects

- **Project #1**, Wall Coating / Encapsulation
  - **Project size: 90,000 ft^2 (8360 m^2)**
  - **Applied film thickness: 100 mils (2.5 mm)**
  - **ASTM D7091-05 Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Nonferrous Metals**

Polyurea Spray Projects

- **Project #2**, Polyurea/Geotextile Secondary Containment Lining
  - **Project size: ~410,000 ft^2 (~38,090 m^2)**
  - **Applied film thickness: 70 mils (1.8 mm)**
  - **ASTM D6132-04 Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings over Concrete Using an Ultrasonic Gage**
  - **ASTM D1005-07 Standard Test Method of Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers**
  - **ASTM D751-00 Standard Test Methods for Coated Fabrics**

Travel Distance

From Contractor Location to Project

- **Project #1**
- Cincinnati, Ohio to Amarillo, Texas
  - 1100 miles, or 1770 km (~ 20 hours)

- **Project #2**
- Ft. Myers, Florida to Albany, New York
  - 1400 miles, or 2250 km (~ 24 hours)

- **For Comparison:**
- Hirtshals, Denmark to Villach, Austria
  - 1610 km, or 1000 miles

Pure Polyurea Systems

- **Project #1**, Wall Coating / Asbestos Encapsulation
  - Fast set, aromatic system
  - High thermal properties, coal-fired power plant
  - Hard, low surface energy finish, ease of cleaning

- **Project #2**, Polyurea/Geotextile Liner
  - High elongation, good tensile, vehicular traffic
  - Flexible at low temperatures
  - Very low linear shrinkage, < 0.1%
  - Enhanced color stability
  - Not a hybrid system, true polyurea

- Not all polyurea systems are the same!

Site Access

- **Project #1**
  - 11th Floor of coal fire power plant, 3 buildings
  - No freight elevator, equipment placements
  - Most of plant in operation

Site Access

- **Project #1**
  - 11th Floor of coal fire power plant, 3 buildings
  - No freight elevator, equipment placements
  - 2 spray units used, relocate in each building
  - Material supplied in totes / IBC's

Site Access

- **Project #2**
  - "wide open" area

Application location,

~ 410,000 ft^2 / 38,000 m^2

Site Access

- **Project #2**
  - "wide open" area
  - Active fuel storage area
  - 2 trailer units used, staged
  - Material supplied in drums, 4 truck loads
  - Rolls of geotextile to move / place

Surface Preparation

- **Wall Coating / Encapsulation**
  - SSPC-SP 1, Solvent Cleaning
  - Used LP WC with hand brushes (SSPC-SP 2, Hand Tool Cleaning)
  - Removed loose debris and coal dust
  - Minimized asbestos paint disruption / removal
  - Excellent bonding noted

Surface Preparation

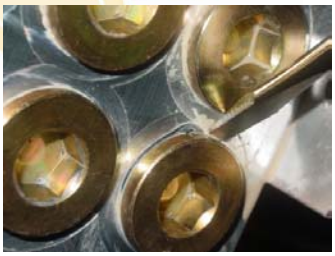
- **Polyurea / Geotextile Lining**
  - SSPC-SP 3, Power Tool Cleaning
  - “Bobcat” fitted with power-roller brush
  - Removed loose gravel, knocked down asphalt heave
  - Geotextile covered the asphalt substrate

Application Issues

- **The Mighty Wind!**
  - Lifted a previously applied section
  - Poor termination technique

Equipment Issues

- **Project #1**
  - Blown resin heater plugs, factory equipment issue
  - Off-ratio application, clean-up
  - Proper training prevented application problems



Equipment Issues

- **Project #2**
  - Broken Clevis', proportioner
  - Off-ratio application of material, re-spray / repair
  - Prepared, had replacement parts!

Myth of Polyurea & Moisture

- **Project #1**
  - Complete delamination of wall area
  - Substrate temperature **not** above dew point
  - Thin sheet of ice present (invisible)
  - Remove, prep & re-spray

Myth of Polyurea & Moisture

- **Project #1**
  - What is the required substrate temperature to dew point temperature difference?
  - Substrate **MUST** be 5°F (3°C) above, and rising, the dew point temperature!
  - Moisture and / or ice on substrate will inhibit bonding of polyurea

Myth of Polyurea & Moisture

- **Project #2**
  - Foaming of applied polyurea
  - Water in Resin drums, loose bungs & rain
  - Infamous "purple" liquid
  - Cut-out and repair

Myth of Polyurea & Moisture

- **Project #2**
  - Eventhough a ***Polyurea***, if you put / get water in the system, it may react and cause issues…..

$$R - N{=}C{=}O + H_2O \rightarrow \rightarrow R - NH_2 + CO_2\uparrow$$

Spray in Progress

Polyurea Spray Projects

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Project Completion

- **Project #1**
  - Completed in 26 days, 7 days ahead of schedule!
  - Used various high output and low output spray guns
  - Most time spent moving equipment

Project Completion

- **Project #2**
  - Completed in 47 days, on schedule!
  - Used single type configured spray gun

Conclusion

- Don't always just start
  - Lots of preparation & pre-conferences
- Properly planned / scheduled projects
  - Can be easily completed on-time
- Prepared **training** / spare parts
  - Reduces downtime and re-work
- Professional Work !!!

Acknowledgements

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SSPC The Society For Protective Coatings