DTM Polyaspartic Coatings

Field performance update

9/18/2017 MARTS
Ahren Olson
This presentation may contain forward-looking statements based on current assumptions and forecasts made by Covestro AG or subgroup management. Various known and unknown risks, uncertainties and other factors could lead to material differences between the actual future results, financial situation, development or performance of the company and the estimates given here. These factors include those discussed in Covestro’s and Bayer’s public reports which are available on the Covestro website at www.covestro.com as well as on Bayer AG’s website at www.bayer.com. Covestro assumes no liability whatsoever to update these forward-looking statements or to conform them to future events or developments.”
Agenda

• Brief technology review
• Case History
• Summary
Polyaspartic coatings are based on polyurea chemistry

\[
R\-N\equiv C\equiv O \quad + \quad R'\-OH \quad \rightarrow \quad R\-N\-C\-O\-R' \\
\text{Isocyanate} \quad \text{Polyol} \quad \text{Urethane}
\]

\[
R'\-N\equiv C\equiv O \quad + \quad H\-N\-X \quad \rightarrow \quad R'\-N\-C\-N\-R \\
\text{Isocyanate} \quad \text{Aspartate} \quad \text{Aliphatic Urea}
\]
Polyaspartic coatings bring both application and physical property advantages

Application
- Fast cure with potlife
- High film build
- Spray, brush, and roll

Physical Properties
- Color and gloss retention
- Edge retention
- Corrosion resistance
Increased shop throughput without sacrificing performance

- Increasing throughput by faster drying and handling times
- Combining the benefits of the epoxy and the polyurethane
- Excellent low temperature cure
Diverse market applications for polyaspartic coatings

- Rail Cars
- Bridges
- Piping
- Stadiums
- Wind Turbine Towers
- Storage Tanks
Case history – original application 2002

- ~ 250 Hopper cars coated with a DTM polyaspartic between 2002-2003
  - Steel blasted to SSPC-SP 6 / NACE No.3
  - Two applicators applied 8-10 mils DFT
  - 40 min/car
- **Excellent application in hard to coat areas**
- **~30% Savings in time and labor**

<table>
<thead>
<tr>
<th>Coating System</th>
<th>Material Usage</th>
<th>Labor Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTM Polyaspartic</td>
<td>36 Gallons</td>
<td>10.5 Hours</td>
</tr>
<tr>
<td>2 Coat Epoxy/Urethane</td>
<td>35 Gallons</td>
<td>15.5 Hours</td>
</tr>
</tbody>
</table>

Original application replaced epoxy/polyurethane
Decals applied 3-4 hours after application
Case history – 14 years of solid performance

- Originally painted 2002
- 14 years in service with less than 0.1% rusting
- Performance equal to epoxy / polyurethane systems
Case history – equal performance to epoxy/polyurethane

LUPX 60676 - PAS

LUPX 60630 – EP/PUR
Case history – excellent performance
Excellent protection on welds
Excellent protection in hard to coat areas
Resistance to rust undercutting
### Case history – Significant DFT remain after 14 years in service

<table>
<thead>
<tr>
<th>Car Number</th>
<th>Coating System</th>
<th>% Rusting</th>
<th>Average Coating DFT (mils)</th>
<th>Number of DFT Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUPX 60607</td>
<td>DTM PAS</td>
<td>&lt;0.1</td>
<td>~ 6.0</td>
<td>54</td>
</tr>
<tr>
<td>LUPX 60676</td>
<td>DTM PAS</td>
<td>&lt;0.1</td>
<td>~ 6.2</td>
<td>57</td>
</tr>
</tbody>
</table>

- After 14 years, ~3 mils have eroded / chalked away.
  - This equates to a rate of ~0.2 mils per year
  - In comparison aromatic epoxies erode / chalk at a rate of ~1.0 mils per year

- At the current rate, after another 10 years, ~4 mils of polyaspartic coating should be protecting the steel
Polyaspartic coatings can increase throughput in painting operations by reducing the number of layers and providing quick drying characteristics.

Based on field experience, 8-10 mils of polyaspartic is expected to last 20-25 years prior to repainting.
QUESTIONS?

Ahren Olson
Ahren.olson@covestro.com
412-413-4519