High Durability Architectural Coatings Technology Targeted At High Touch High Scrub Areas

COV002
Learning Units: 1.0 LU/HSW

Steven Reinstadtler

covestro.com
Learning objectives

Upon completing this program, the participant should be able to:

1. Understand the durability, safety and economic challenges facing facility owners and the industry trend of migrating industrial coatings into architectural applications
2. Name the top three traits preferred by building decision makers related to higher performance coatings discovered via in-field research
3. Explain how different commercial coatings are affected by common maintenance chemicals and which perform best
4. Be familiar with new high performance coatings technologies that can be used in new and maintenance high touch, high scrub areas where there is a need for extreme durability
Agenda

- Introduction to the Problem
- Research and Input from Decision Makers
- The Technology: Durability Testing and Comparisons
- Summary
- Questions and Answers
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Industrial Maintenance Coatings are Migrating into the Commercial Architectural Space

LEED recognizes and integrates performance standards into new IEQc4.2
(Source: http://www.leeduser.com/credit/NC-2009/IEQc4.2)

Deadly Admissions: Hospital-Acquired Infections Are 4th-Largest Killer in U.S.

By Tracy Wheeler, The Akron Beacon Journal, Ohio

At an estimated 90,000 deaths a year, these hospital-acquired infections kill as many people in the United States as AIDS, breast cancer and car accidents combined.
(Source: http://www.redorbit.com/news/health/351010/deadly_admissions_hospitalacquired_infections_are_4thlargest_killer_in_us_but/#)

MPI launches new High Performance Architectural categories in their approved product lists (Source: http://www.paintinfo.com/mpi/approved)

The issue is significant and actions are being taken
The timing is right
Architectural Coatings Technologies
What and Where are Target Areas?

High durability architectural coatings technology has been developed based on market preferences.

Targeted at these types of buildings:
- Hospitality
- Higher Education
- Hospitals
- Government
- Resorts/Sports Venues
- Office Buildings
- Primary Education
- Retail

With challenges in these types of building parts:
- Doors
- Walls
- Trim
- Floors
- Bathroom ceilings

There’s a need in 15-20% of targeted buildings for a higher performance option.

In these situations:
- New/Major Renovation
- Maintenance
- Interior
- Exterior
- Corrosion
Healthcare Related Organizations Develop More Stringent Standards and Insurance Carriers Change Policies:

The Center for Disease Control (CDC) puts out "Guidelines for Disinfection and Sterilization in Healthcare Facilities" outlining new disinfection guidelines.

The Joint Commission (TJC) incorporates tougher disinfection protocols for high risk environments in hospitals such as operating rooms, trauma bays, procedure rooms.

Most health insurance companies changed their protocols. As of January 2009, they will not pay for Hospital Acquired Infections (HAI). Hospitals implement stronger preventative measures.

The Result: Traditional architectural paints are not holding up long term to the increased scrubbing and harsher chemicals.
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Defining the Problem
Multiple Points in the Value Chain

To define the unmet need, we engaged stakeholders:

- Facility Managers
- Architects/Spec Writers
- Maintenance Personnel
- Painting Contractors
- Facility Management and Administration

And *listened* to how they defined the problem...
Research from Key Personnel
Goal: Reduce repaint cycle, keep areas safe, save money

After *listening*, we heard that they wanted:

- A more **durable, scrubbable** wall coating in the high risk areas
- A very **low odor** coating that would not disrupt operations
- ‘Warmer’ **eggshell or matte** coatings but still have durability
- An **easier to clean and seamless** surface
- **Less downtime** in the high operating cost areas
- To create **more flexibility and creativity** in current spaces
Research from Key Personnel

Goal: Reduce repaint cycle, keep areas safe, save money

*Values are Typical*
The Preferred Attributes from Around the Country

- Price: 25%
- Durability: 30%
- Odor: 33%
- Room Availability: 4%
- Labor Cost: 4%
- VOC: 4%

*Based on listening events with healthcare and university personnel*
The Value Proposition From the Hospital’s Point of View

For the hospital administrator who is concerned with meeting the CDC protocols without sacrificing aesthetics and durability, a high durability coating technology has been developed for rooms requiring frequent cleaning that offers improved durability and resistance to harsh cleaners and disinfectants without sacrificing appearance.

Compared with conventional wall paint:
- 6-8x more durable and scrub-able
- Same ease of use, color palette, and low gloss finish

Compared to tile:
- 4-5x lower cost
- Better design latitude for future color schemes
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The High Durability Wall Coating Technology is an Architectural Wall Paint Alternative

Two Component Waterborne Polyurethane Technology

Specifically targeted at high touch, high scrub venues

Attributes:

- High durability even in an eggshell or flat finish
- ‘Silky’ surface makes cleaning easier
- Excellent chemical and disinfectant resistance
- Very low odor during installation and drying
- Ultra low VOC and solvent at 15g/l or less
- Can be used as a dry erase wall paint
- Same color palette as traditional architectural wall paint
Two component (2K) waterborne coatings cure by both drying and reacting

Chemistry:

2K aliphatic polyurethane based on polyurethane or polyacrylate dispersions and aliphatic isocyanates

Polyurethane Dispersion  Aliphatic Hardener

Dry and react to form

A Polyurethane Coating
2K waterborne coatings have desirable traits and an excellent price-performance ratio

Benefits:
- Excellent durability
- Excellent color/gloss retention
- Gloss to matte finish available
- Long working time
- Ultra low VOC (<15g/L)
- Very low odor

Drawbacks:
- Cold weather/high humidity lengthens cure time
- Two component – requires mixing step
We’ve done comparative durability testing with typical disinfection chemicals

<table>
<thead>
<tr>
<th>Paint or Coating</th>
<th>VOC* g/l</th>
<th>Clorox Cleanup® Double Rubs*</th>
<th>Ecolab Disinfectant Cleaner® Double Rubs*</th>
<th>Betadine® 1 hr. spot test**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1K Waterborne Acrylic 1</td>
<td>44</td>
<td>54</td>
<td>104</td>
<td>3</td>
</tr>
<tr>
<td>1K Waterborne Acrylic 2</td>
<td>40</td>
<td>62</td>
<td>380</td>
<td>2</td>
</tr>
<tr>
<td>1K Waterborne Acrylic 3</td>
<td>0</td>
<td>250</td>
<td>400+</td>
<td>2</td>
</tr>
<tr>
<td>1K Waterborne Epoxy A</td>
<td>155</td>
<td>280</td>
<td>400+</td>
<td>2</td>
</tr>
<tr>
<td>1K Waterborne Epoxy B</td>
<td>96</td>
<td>320</td>
<td>400+</td>
<td>2</td>
</tr>
<tr>
<td>1K Waterborne Epoxy C</td>
<td>96</td>
<td>275</td>
<td>400+</td>
<td>2</td>
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<tr>
<td>2K Solventborne Epoxy</td>
<td>169</td>
<td>205</td>
<td>400+</td>
<td>2</td>
</tr>
<tr>
<td>2K Waterborne Polyurethane based on Covestro technology</td>
<td>8</td>
<td>4000+</td>
<td>4000+</td>
<td>1</td>
</tr>
</tbody>
</table>

*From comparative testing
*Values are typical

**0= no stain
1= faint stain
2= yellow stain
3= brown stain

Waterborne Polyurethane Wall Coating Technology exceeds the stringent protocols of MPI #252, MPI #254, and MPI #256 Paint Standards
The differences are dramatic when tested using common chemicals

**Picture 1:** Typical Waterborne Acrylic

**Picture 2:** 2K Waterborne Polyurethane
### Internal “Sniff Test” Developed to Quantify a Qualitative Observation

<table>
<thead>
<tr>
<th>Paint or Coating</th>
<th>Odor Value* (1 = low, 5 = high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1K Waterborne Acrylic 1</td>
<td>1</td>
</tr>
<tr>
<td>1K Waterborne Acrylic 2</td>
<td>1</td>
</tr>
<tr>
<td>1K Waterborne Acrylic 3</td>
<td>2</td>
</tr>
<tr>
<td>1K Waterborne Epoxy A</td>
<td>4</td>
</tr>
<tr>
<td>1K Waterborne Epoxy B</td>
<td>4</td>
</tr>
<tr>
<td>1K Waterborne Epoxy C</td>
<td>4</td>
</tr>
<tr>
<td>2K Solventborne Epoxy</td>
<td>5</td>
</tr>
<tr>
<td>2K Waterborne Polyurethane based on Covestro technology</td>
<td>1</td>
</tr>
</tbody>
</table>

*average of values from 25 marketing and technical personnel
Our internal testing was verified by external trained panel of judges

<table>
<thead>
<tr>
<th>Paint or Coating</th>
<th>Odor Intensity at 4 hours* (0= none, 100= high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1K Waterborne Acrylic Latex, zero VOC</td>
<td>30</td>
</tr>
<tr>
<td>1K Waterborne Acrylic Epoxy</td>
<td>75</td>
</tr>
<tr>
<td>2K Waterborne Polyurethane based on Covestro technology</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hedonic Tone</th>
<th>Value at 4 hours** (-10= worst, +10= pleasant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1K Waterborne Acrylic Latex</td>
<td>- 0.1</td>
</tr>
<tr>
<td>1K Waterborne Epoxy</td>
<td>- 0.1</td>
</tr>
<tr>
<td>2K Waterborne Polyurethane based on Covestro technology</td>
<td>+ 3.0</td>
</tr>
</tbody>
</table>

*Compared against butanol standards

**Hedonic Tone: overall pleasantness of the odor
There are green building targets where coating choice can contribute to LEED credits or achieving certification.

LEED NC v2009 IEQc4.2 and NC v4 IEQ Options 1 and 2
- Architectural coatings meeting and passing these requirements:
  - SCAQMD Rule #1113
  - CDPH Standard Method v1.1
  - Green Seal GS-11

LEED NC and EBOM IDc1 or IOc1
- High performance architectural coatings can contribute to innovation in operational efficiencies by their demonstrated long term durability over drywall and existing paints and coatings.

Your specific coating supplier will have listing information for their products.
There are industry standards for the safe use and handling of architectural coatings.

High performance architectural coating systems, which can contain an aliphatic hardener during mixing and application, can be safely used when the recommended engineering controls, PPE and handling procedures are implemented.

After cure, the coating is fully reacted and is a solid polyurethane film.
The coating applicator will need to consider safe use and handling recommendations

Appropriate controls are determined by various factors

- Degree of hazard
- Type of application
- Duration of application

Recommendations for Handling Aliphatic Hardeners

- Training of personnel
- Implementation of engineering controls (e.g., local exhaust ventilation)
- Personal protective equipment (e.g., respirators, clothing, and gloves)
- Medical surveillance
- Workplace monitoring
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Summary

- There is a real need for high durability architectural coatings as industrial maintenance coatings migrate into the commercial architectural coatings market
- Bayer has developed a waterborne polyurethane technology that allows for:
  - High durability when exposed to harsh chemicals and repeated scrubbing
  - Low odor during application and drying needed in occupied environments
  - Meeting aesthetic requests for eggshell finish without compromising durability
  - Can be used as a dry erase wall paint for design flexibility and creativity
Thank You!

Steven Reinstadtler
Covestro
412.413.2561
steven.reinstadtler@covestro.com