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JPCL
JOURNAL OF PROTECTIVE COATINGS & LININGS
The Voice of SSPC: The Society for Protective Coatings

Cover: istockphoto

Also this month

From the Offices of SSPC The Society For Protective Coatings

SSPC recently launched an all-new sspc.org! For quick access, use your smart phone to capture this barcode.

JPCL STAFF

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Rule #1: Take Care of the Customer

First of all, I would like to thank all of those who gave to the Japan relief fund SSPC sponsored on our web site. The Board of Governors decided to have SSPC match any donations up to $5,000. With the Hampton Roads Chapter's generous donation of $5,000 and the response of other SSPC members, we were able to collect over $11,500. We wired the SSPC Japan Chapter $16,500, which will hopefully aid those affected by the earthquake and subsequent tsunami that occurred in March. I have received communication from the chairman of that chapter, and he was quite surprised and grateful for the generosity of the SSPC members.

Communication is an important element in a successful organization. Recently, I spoke with a contractor member about the Certified Applicator Specialist (CAS) Program. The member, who runs a very large contracting firm, shared with me some concerns about the program, and we have begun addressing those issues. There are two things that I want to mention in relation to our conversation.

First, I really appreciate the fact that the member gave me a call. Sometimes I get information from second-hand sources. Someone pulls me aside and says that this person or that person is upset with SSPC, and my first response is, "Why don't they call or e-mail me and ask me to call them?" I came from an organization where folks told it like it was and did not beat around the bush. Those who were not upfront did not go far. How can things be improved if people don't communicate? I know this is an old theme; however, many organizations do not function effectively because folks shy away from the issues. I have heard all the reasons why there is no communication—fear of reprisal, being labeled as a troublemaker, etc.

As members, you have the final vote because you vote with your dollars. Your response to not liking something we do or say might be dropping your membership. Of course we don't want you to do that, and we do our best to keep our customers happy. We have a sign at the end of a hallway in our office that says "Rule #1: If we don't take care of the customer...somebody else will." I firmly believe in that poster, and management at SSPC does its best to instill that attitude in everyone here. When a customer has an issue, we may not always agree, but we will clearly let you know what we were thinking when the decision was made. I promise if you talk to me I will lay my cards on the table. There may be times that we agree to disagree. Unless there is a rule or procedure against it, we will find a compromise. I do ask that you work through the SSPC staff and each specific director, but if you feel you are not being heard, let me know, and we will talk. I appreciate the fact that the president of this contracting firm called me and gave me my "day in court."

Secondly, as we were talking, the president mentioned that more of the firm's customers are asking for trained and/or certified blasters and painters, and the president sees this as the way of the future. I agree completely, and I am not just saying this to promote our training programs. When I get any work done on my house or car, I look for someone who is licensed by the state; is insured; is certified (in the case of my car, Society of Automotive Engineers-certified); and can give me references of similar work done in the past.

For years, the U.S. Navy has required certified blasters and painters on its critically coated areas. Critically coated areas are those such as tanks, voids, and slip-resistant decks and walkways. This requirement has reduced coating failures, which is crucial since the length of time between maintenance cycles has increased. This is also important because the number of ships has declined, and their operational tempo (op tempo) has increased with the U.S. involvement in two wars. I do commend the president of that firm for thinking far ahead and not thinking that the requirements for workers would lessen.

I also feel that having a trained/certified workforce will add that important element of pride, which will help ease the concern and problem of attracting people to the coatings industry. This is an issue we hear a lot from those working in the field. As you all know, training leads to self-pride in an individual and the feeling that he or she has upward mobility. We all have to be forward thinking, as the aforementioned president was, and we, SSPC, need to be prepared to assist the membership in increasingly diverse ways as the workforce dynamics change.

Bill Shoup
Executive Director, SSPC

SSPC/*JPCL* August Webinar on One-Coat Systems in Public Works Projects Planned

The results of FHWA research on laboratory and field performance of both one-coat and long-term coating systems for bridges will be the subject of the SSPC/*JPCL* Education Series Webinar, "One-Coat Systems for Public Works Projects," to be presented by Eric Kline of KTA-Tator on Aug. 10, 2011, from 11:00 a.m. to noon EST.

Participation in the webinar is free. Participants can register at www.paintsquare.com/education.

Webinars provide continuing education for SSPC recertifications, as well as technology updates. While participation in the webinar is free, for those who wish to receive continuing education credits from SSPC, a test ($25 charge) is available after the webinar. All participants receive a free certificate of completion.

Eric Kline

The webinar will describe two FHWA research projects on coating performance, the performance data that was developed, and conclusions derived from the data, with a focus on promising one-coat systems and systems with potential for long-term service.

Eric Kline is executive VP and senior consultant for KTA-Tator. He has 38 years of experience in the protective coatings industry; has published numerous articles on bridge painting in *JPCL* and elsewhere; and is an active member of SSPC.

Termarust Technologies is sponsoring the webinar.

SSPC Board of Governors Election Results

Marty Stamey

Dr. Brian Skerry

L. Skip Vernon

SSPC is pleased to announce the results of the recent Board of Governors election, conducted May 6 to June 15, 2011.

There were three open seats on the Board due to expiring terms. Those seats were in the Contractor, Coating Supplier, and Other Provider demographics.

The winning candidates include:

- Contractor: Mr. Marty Stamey, Senior Vice President, Global Business Development, The Brock Group
- Coating Material Supplier: Dr. Brian Skerry, Global Technical Director, Sherwin-Williams Protective & Marine Coatings Division
- Other Service Provider: Mr. L. Skip Vernon, President and Owner, Coating & Lining Technologies, Inc.

The newly elected Board members will serve a four-year term beginning July 1, 2011 and ending June 30, 2015.

Upcoming Conferences Accepting Abstract Submissions

Papers are now invited for a new international conference and exhibition program that will address key issues in oil and gas pipeline rehabilitation. The Evaluation, Rehabilitation & Repair of Pipelines Conference and Exhibition will be held in Houston, TX, on Oct. 31–Nov. 3, 2011.

Abstracts of 200 words or less are being accepted until July 25. Planned programs of interest for the conference include inspection; integrity assessment; repair or rehabilitation practices and technologies; internal issues (e.g., microbial corrosion); and external issues (e.g., coatings).

Visit www.clarion.org/errp/errp-2011/index.php for more information.

The International Thermal Spray 2012 Conference and Exposition (ITSC 2012) is accepting abstracts until Aug. 1, 2011 for its conference in Houston, TX, on May 21–24, 2012.

Conference organizers are seeking original, previously unpublished, non-

Early Bird Exhibit Pricing for SSPC's 2012 Show Ends July 29th

Early Bird pricing for exhibit booths at SSPC 2012 featuring GreenCOAT is available until July 29, 2011. SSPC 2012 will be held at the Tampa Convention Center in Tampa, FL, from January 30 to February 2, 2012.

SSPC 2012 is the industry's only 100% protective, marine, and industrial coatings show. In addition to a vast exhibit hall, the annual conference offers educational programming with technical sessions and workshops focusing on surface preparation, application, coating formulation, testing, inspection, and green coatings solutions. SSPC's training and certification programs are also offered.

The trade show features over 200 exhibitors annually. To secure a spot on the exhibit floor, contact Kate Jurik at 412-281-2331, ext. 2211, or jurik@sspc.org.

Video Proceedings From SSPC 2011 Now Available

If you missed the 2011 SSPC show in Las Vegas or have never attended the event, see what you've been missing by viewing the SSPC 2011 video proceedings.

The video proceedings, sponsored by Mascoat and Sherwin-Williams, include 20 presentations from four sessions: Conquering Corrosion with Coatings; Green—From Start to Finish; Green Opportunities & Sustainability for Growth; and Protective Coatings & Environmental Impact.

The official web site for SSPC 2012 featuring GreenCOAT will launch soon; in the meantime, all show information can be found at www.sspc.org. To access the free video proceedings directly, visit www.sspc.org/sspc-events/sspc-2011-video-proceedings.

commercial papers for oral and poster presentations in all topical areas of thermal spray technology including, but not limited to: application; military applications; advanced thermal spray coatings; thermal spraying for the oil and gas industry; surface engineering; and cold spray. Abstracts must be between 100 and 300 words.

Visit www.asminternational.org/itsc for more information.

The American Coatings Association (ACA) is seeking abstracts for its 2012 Coatings for Concrete Conference to be held in Las Vegas on Jan. 23, 2012. Held in conjunction with World of Concrete, this one-day conference is seeking abstract submissions by Aug. 24, 2011.

Themes and suggested topics include concrete composition, testing for concrete coatings, horizontal vs. vertical concrete coatings, VOC regulations for concrete coatings, new technologies for concrete coatings, protective coatings for concrete, and failures of concrete coatings.

Visit www.paint.org for more information.

In partnership with Vincentz Network, ACA is also planning the American Coatings Show and Conference 2012, to be held in Indianapolis, IN, from May 7–10, 2012. Abstracts are being accepted until Sept. 30, 2011.

Possible topics include innovations in raw materials; studies on chemical and physical mechanisms that affect coatings formulation; laboratory testing and analysis methods and equipment; new developments in processing and production techniques and equipment; and related subjects.

More information is available at www.american-coatings-show.com/callforpapers.

The 29th Annual International Bridge Conference (IBC) will be held June 10–13, 2012 in Pittsburgh, PA. Abstracts of 250 words or less are being accepted for IBC 2012 until Oct. 1, 2011.

Paper topics include bridge maintenance programs; design/build techniques; fabrication methods; graffiti removal; innovative design concepts; innovative materials applications; lessons from bridge failures; load testing and instrumentation systems; long span bridges; NBIS bridge inspections; rehabilitation and strengthening; surface preparation and high-performance coating systems; and other relevent issues.

Visit www.eswp.com for information.

Sherwin-Williams Acquires Leighs Paints

On July 6, The Sherwin-Williams Company (Cleveland, OH) announced its acquisition of Bolton, UK-based Leighs Paints.

Leighs Paints manufactures intumescent passive fire protection products, including its FIRETEX® brand, which has been used on offshore platforms, refineries, and chemical plants.

With the acquisition, Sherwin-Williams gains a team of structural engineers who specialize in fire science and assist project owners and engineers with specification and compliance in this area.

Leighs Paints' sales and technical support centers are located in the U.K., Canada, India, Germany, and UAE. Its products are distributed worldwide.

The Sherwin-Williams Company manufactures, develops, distributes, and sells coatings and related products to professional, industrial, commercial, and retail customers. The Global Finishes Group delivers products to markets, including protective and marine, in 109 countries.

For more: www.paintsquare.com

On Solving Moisture Permeation Problems in Concrete Slabs

This Month's Question: When moisture permeates concrete slabs or walls below grade, how can this problem be solved, and does it require excavation?

From Peter J. Bakke

Midwest Industrial Coatings—WI, LLC

The problem can be resolved by addressing the moisture where it originates, on the positive side of the slab. This is accomplished by injection of a polymer grout. The particular type of grout is a bentonite clay product with huge water absorption capabilities.

The equipment is easy to use and easy to move around, and the process of injecting the grout is straightforward. This type of product has been in the industry since the early 1980s and to date is the only one I know of that allows you to avoid excavation by treating the positive side of the wall.

From Wayne Salisbury

Conproco Corp.

This problem may be resolved without excavation by treating the negative side. Any active leaks must first be plugged. The surface must be prepared by opening up the cement. Then, a crystalline-based cementitious (water) sealer coat is applied to the surface, usually in two coats. This approach will often solve the problem.

Editor's Note: *The above Problem Solving Forum (PSF) question was posted on the free daily electronic newsletter,* PaintSquare News (PSN)*, on behalf of* JPCL*. PSF responses submitted through* PSN *as well as those sent directly to* JPCL *are selected and edited to conform to* JPCL *style and space limitations.* JPCL *invites additional responses to the question; you may send your answer directly*

to Karen Kapsanis, editor, JPCL, *kkapsanis@protectivecoatings.com.*

More Questions, More Answers

Listed below are several other Problem Solving Forum questions recently posted on *PaintSquare News* and archived on PaintSquare.com, the electronic home of *JPCL*. Readers are welcome to view and respond to any of the questions (and answers) already posted. To read all questions and answers posted on *PSN*, click the Problem Solving Forum question on any edition of *PaintSquare News* or visit www.paintsquare.com/psf/?fuseaction=previous. You may also submit your own questions online.

- Which DFT statistics should be recorded in a daily inspection report, and why are they relevant to a good coating QC record?
- I need to embed a metallized culvert liner on concrete. I've been told I have to paint it to avoid adhesion problems between the metal liner and the concrete. Is this true and, if so, what type of coating is best?
- What is the preferred method to remove 25-year-old coal tar epoxy from a carbon steel tank in order to reline?
- What smartphone apps or online tools do you find useful in your job? How do they work, and how have they benefited you?
- What percentage of deterioration is acceptable at a one-year warranty inspection of water tank linings before a contractor must repair the coating job?
- What is the most common or economical coating system for rehabbing the exterior of above-ground storage tanks?
- What is best way to remedy overthickness of a topcoat after it has dried and cured?
- A specification requires Manufacturer X's system "or equivalent." What does "or equivalent" mean, and who decides what's "equivalent?"
- When specifying coatings for maintenance repainting of structural steel, under what conditions is it acceptable to settle for a surface-tolerant system, and when is such a system unacceptable?
- How do you gauge the remaining service life of an aging FBE system on a buried transmission pipeline?

How Do I Get *PSN*?

If you do not already receive *PaintSquare News*, register for the free e-newsletter at www.paintsquare.com/psn/, or use your smartphone to capture the barcode.

The Case of... Not All Coating Systems Are Created Equal

By Jayson L. Helsel, P.E., Senior Coatings Consultant, KTA-Tator, Inc.
Richard A. Burgess, Series Editor, KTA-Tator, Inc.

An industrial equipment manufacturer in the midwest U.S. needed to find a new coating system when its current coating supplier went out of business. The company had previously used a two-coat alkyd coating system with good results. A small coating manufacturer in the region was contracted to manufacture and supply a coating system suitable for use on the equipment. The service environment for the various manufactured steel equipment (once coated) was interior and exterior exposure.

Before painting, the steel was prepared by high-pressure water cleaning using cleaner and phosphate additives. The process allowed adherent mill scale to remain on the steel. The new supplier recommended a two-coat, water-reducible alkyd coating system. Initially, there appeared to be a compatibility problem between the primer and topcoat that prevented the topcoat from wetting the primer surface uniformly, which resulted in poor coverage of the primer. The supplier worked to improve the performance of the products through formulation changes by using additives in the topcoat to improve compatibility. The changes appeared to result in an acceptable system.

A few months after the new coating system was in use, the equipment manufacturer began to receive complaints from customers that paint was delaminating from their equipment. After the coating problems were reported and the climate turned colder, recently painted equipment that was stored outside of the warehouse facility began to show delamination of the topcoat. The coating supplier suggested that the failing paint on the equipment stored outside had not been allowed enough time to cure in the warehouse. Consequently, equipment was held inside for a longer period before storage outside or shipment to a customer. However, the equipment manufacturer continued to receive customer complaints about failing paint throughout the winter. It was also observed that a water-moistened rag placed on equipment containing properly cured coating still inside the warehouse caused the paint underneath to blister.

The equipment manufacturer continued to seek help from the coating supplier to resolve the problems but was eventually told that the failures must have been caused by a processing problem in the cleaning or painting steps and not because of the coatings. At this point, the equipment supplier contracted with a coatings consulting/engineering firm to conduct an independent investigation into the coating problems.

The Investigation

The investigator visited the manufacturing site to assess the condition of the coating on the equipment and observe the coating process. The first piece of equipment examined was located outside and exhibited cracking and peeling of the glossy orange-color coating over most of the horizontal surfaces and some vertical surfaces. The intact coating on most of the vertical surfaces appeared to be in good condition and did not show signs of peeling or cracking. The coating was delaminating from the steel substrate in many places, though an exposed orange primer was visible at some locations. Rusting was evident where the bare steel had been exposed, but no underfilm corrosion was present.

The adhesion was evaluated using the tape adhesion test (ASTM D3359) and by subjective probing with a utility knife. In nearly all locations of intact coating, the results were rated from fair to good. The thickness of the total coating system was measured at various locations and ranged from 5 to 7 mils. The measurements taken where both the primer and topcoat were intact averaged 5.5 mils on horizontal surfaces and 5.8 mils on vertical surfaces. The thickness of the exposed primer

Continued

Jayson Helsel, P.E., a senior coatings consultant with KTA-Tator, Inc., manages failure investigations and coatings projects and is involved with coatings surveys and inspection of industrial structures.

He holds an MS in chemical engineering from the University of Michigan, is a registered professional engineer, and is a NACE-Certified Coatings Inspector. He has been published in the past in *JPCL* and in the *Journal of Architectural Coatings*, which featured his monthly column, "Getting It Right."

Fig. 1: The test panel with System #1 (specified system) showed discoloration and blisters after moisture exposure. Photos courtesy of KTA-Tator, Inc.

where the topcoat had delaminated averaged 2.5 mils, indicating the topcoat thickness was approximately 3 mils.

An older piece of equipment that was available to customers as a rental unit was also located outside, but the coatings were in much better condition. This equipment also had a glossy orange coating that was in good condition with no peeling, cracking, or rusting aside from minor coating damage, mostly along edges. This damage appeared consistent with mechanical abrasion that might be expected from repeated use. The rental equipment contained the older coating system that had been used in previous years without any reported problems. The adhesion was rated as good, and coating thickness ranged from 5 to 7 mils. The coating thickness on horizontal and vertical surfaces averaged 5.6 mils and 4.7 mils respectively. A small area of exposed orange primer averaged 2.7 mils, which indicated that the topcoat thickness was approximately 2 to 3 mils.

A third piece of equipment examined was inside the facility and had been stored there since the coating system was applied earlier in the year. The coating condition appeared good overall, with no areas of peeling or delaminating paint apparent. However, a rag moistened with water and placed on one of the horizontal surfaces had caused the coating underneath to form small blisters. The rag had been sitting in that location for approximately 2 days, and the phenomenon was consistent with previous observations. The adhesion on the vast majority of surfaces was rated as good and only one spot had poor adhesion. The thickness of the coating system on horizontal and vertical surfaces ranged from 5 to 7 mils.

The coating installation process, including surface preparation and coating application, was also observed with no issues noted.

Laboratory Analysis

Various coating samples from completed equipment, as well as liquid samples of the current system, were obtained for laboratory analysis.

Product information and material safety data sheets supplied during the visit indicated the primer and topcoat were water-reducible alkyd coatings as previously described. A summary of the information for each coating was as follows.

- Water-reducible primer—Ingredients: magnesium silicate, ethylene glycol monobutyl ether, sec-butyl alcohol, acrylic-modified alkyd, and acrylic latex polymer
- Water-reducible gloss topcoat—Ingredients: 2-butoxyethanol, sec-butyl alcohol, triethylamine, and various pigments

Representative samples were observed in the laboratory by visual and microscopic examination and analyzed by Fourier transform infrared spectroscopy. Test panels were also prepared using the specified coating materials then subjected to moisture and freezing resistance testing.

Microscopic examination revealed about 1 mil of primer and 2 to 3 mils of topcoat. The examination found that the topcoat was severely cracked and glossy. A sample from the back surface (primer layer) was orange, smooth, and cracked. The examination of the cross-section revealed two coats with a total thickness of 3 to 4 mils.

Infrared spectroscopic analysis revealed that the samples were consistent with alkyd coatings.

Moisture exposure and freezing resistance testing were conducted in an attempt to replicate the conditions that may have caused or contributed to the field coating failures. The common observation from reported failures had been delamination of paint on horizontal surfaces, particularly during the colder winter months. Horizontal surfaces are obvious places where moisture in the form of water, ice, or snow can sit for an extended period. The exterior surfaces were subjected to typical freezing or freeze/thaw conditions experienced in the Midwest during the winter.

The testing was designed to evaluate the coating system's resistance to constant moisture exposure and subsequent freezing conditions. A comparison was sought among the specified

Continued

Fig. 2: Test panels for Systems #2 and #3 (comparative systems) showed no effect after moisture exposure.

Fig. 3: The test panel for System #1 (specified system) exhibited cracking and delaminating coating.

coating system, a comparable system from another manufacturer (water-reducible alkyd primer/topcoat), and a solvent-borne alkyd primer/topcoat. Steel test panels were prepared by spray application of the primer and topcoat according to manufacturers' recommendations and allowed to cure for 20 days. A summary of the systems tested is shown in Table 1.

Table 1 – Test Panel Preparation

System	Resin Type
#1 (Specified)	Water-reducible alkyd
#2 (Comparable)	Water-reducible alkyd
#3	Solvent-borne alkyd

The moisture resistance test was conducted by placing water-saturated paper towels in the center of the test panels. The panels were observed over a period of 72 hours for any noticeable differences in the coating surfaces. The paper towels were kept moist during this period, and the temperature remained at laboratory ambient (72 F).

Results

The results showed that System #1 developed small blisters and became lighter in color after 24 hours, while Systems #2 and #3 were not affected (Figs. 1 and 2). After 72 hours, the blisters increased in number for System #1, while there was little change with the other systems, except for a slight discoloration (lighter in color) noted for System #2.

Upon completion of the 72-hour period, the panels were placed in a freezer overnight (for 16 hours). After freezing, System #1 had paint delaminating from the steel substrate over 25 to 30% of the moisture-exposed surface (Fig. 3). Systems #2 and #3 were unaffected by freezing. Table 2 gives a summary of the results.

The results indicated that constant moisture exposure at laboratory ambient temperature alone caused the two-coat, water-reducible alkyd coating system currently in use to blister after 24 hours. In fact, this was the only system to develop blisters over the 72-hour period of moisture exposure. The first sign of any change in the coatings appeared after 7 hours, with a discoloration or lightening of the orange topcoat in the moisture-exposed area. The discoloration indicated that the coating film was absorbing water. A lightening in color was also observed for the comparable water-reducible alkyd system (System #2) after 72 hours, but no blisters formed. The solvent-borne alkyd system was not affected by moisture exposure.

The subsequent freezing step indicated that problems occurred only with the coating system currently in use, which delaminated down to the steel substrate over a significant portion of

Continued

Table 2 – Results of Moisture Exposure and Freezing Conditions

System	Moisture Exposure Period			Freezing
	7 Hours	24 Hours	72 Hours	
1	Slight discoloration	Slight discoloration and blistering	More blisters and discoloration	Delamination over 25-30% of exposed area
2	No change	No change	Slight discoloration	No change
3	No change	No change	No change	No change

the moisture-exposed surface. The "fractured" appearance of the coating was similar to that observed on delaminating equipment during the field investigation. The two other coating systems were not affected by freezing.

The moisture resistance and freezing tests showed that the water-reducible alkyd coatings tended to absorb water into their coating films upon repeated exposure to moisture, while the solvent-borne alkyd system was apparently unaffected. Based on the testing results, the degree of absorption for the various coatings differed. The coating system currently in use clearly had the greatest problem due to the formation of blisters and subsequent delamination upon freezing. The comparable water-reducible alkyd system had some discoloration, indicating water absorption, but blisters did not form, and the freezing exposure did not damage the coating.

The thickness of the coating systems was not considered to be a factor in the observed coating failures. All test panels, including those where the coating system blistered and delaminated, were prepared to achieve the coating manufacturers' recommended dry film thickness (DFT).

Generally, water-reducible alkyds are not ideal coatings for the type of exterior exposure conditions expected during winter in the midwestern U.S. In fact, water-reducible alkyds are known to have inherent problems with moisture exposure. Although the particular formulation of the coating will ultimately determine the susceptibility to moisture, many of the water-miscible co-solvents used in water-reducible alkyds are hydrophilic (i.e., attract water) and remain in the coating film after drying. These co-solvents are necessary in the material formulation to make the paint ingredients soluble in water (i.e., water-reducible). The co-solvents will slowly evaporate from the coating film over time, but certain compounds, such as glycol ethers, may remain in the film for an extended period and may not ever leave entirely.

It was noted that the Material Safety Data Sheets (MSDS) for the specified coating system listed one such co-solvent in their formulations: ethylene glycol monobutyl ether, also known as butyl cellosolve or 2-butoxyethanol (all are synonyms for the same compound).

Ethylene glycol monobutyl ether is a hydrophilic co-solvent that would not evaporate very quickly from the coating film, potentially rendering that film susceptible to water absorption for an extended period. Oxidation, the normal curing process for an alkyd-based coat-

ing (including water-reducible), further retards the escape of co-solvents from the coating film. Oxidation is a process by which the oil-based compounds in the paint slowly react with oxygen in the surrounding atmosphere to harden the coating film over time, beginning with the outside, or exposed paint surface. Although the coating may appear cured or "dry" after 24 hours, the interior of the film has not fully cured and will continue to harden through the oxidation process over the lifetime of the coating. Since the curing process begins from the outside of the coating film, the primer layer will naturally cure more slowly if there is a topcoat, which is normally applied soon after primer. Butyl cellosolve, which was present in the primer and topcoat, would therefore be particularly restricted from leaving the coating film of the primer. If water were to absorb through the topcoat and reach the primer layer, the water would then be absorbed by the butyl cellosolve in the primer. Such a mechanism for water absorption is consistent with the results showing that the specified primer and topcoat had the greatest degree of delamination from moisture exposure and subsequent freezing.

Conclusions

Overall, the field and laboratory investigations showed that the specified coating system was not suitable as formulated for exterior winter exposure conditions. Although water-reducible alkyd coatings can be formulated for such conditions, as shown by the moisture exposure/freezing testing of a comparable system, caution should be used when specifying new coatings. This is particularly true today, where environmental issues and lower coating volatile organic compound (VOC) content are often driving factors in selecting coatings.

When changing coating suppliers, systems, or formulations, it is best to perform independent laboratory testing of candidate coating systems from a variety of suppliers to create a qualified products list, prior to large scale applications to manufactured equipment or fabricated structures. The testing can be designed to simulate, as best as possible, the intended services environment(s) of the coated products.

In this case, the equipment manufacturer resolved the problem by switching to another manufacturer's comparable water-reducible alkyd coating system (System #2 in the laboratory testing). This solution allowed for the continued use of a lower VOC content coating system, while correcting the coating problems that had been occurring.

More Views on Surface Prep Standards: Whose to Use? Try Something New?

Editor's Note: In the March 2011 *JPCL*, Lee Wilson, an experienced painting inspector and consultant, wrote the article, "An Inspector's Views from the Field: Should the World Start to Specify the Joint SSPC/NACE Standards?" (The article was also previously published in the April–July 2010 issue of *Protective Coatings Europe*.)

In his article, Wilson debated whether it's better to follow ISO or joint SSPC/NACE standards for surface preparation. While teaching NACE coating inspection courses, Wilson noticed that many students asked why there were so many standards, and the students exhibited confusion over which standards are identical and which are equivalent.

Wilson's opinion was that the joint SSPC/NACE standards, while not perfect, are more comprehensive than the ISO dry abrasive blasting standards. Using the example of ISO Sa 2.5, Very Thorough, and its equivalent joint standard, SSPC-SP 10/NACE No. 2, Near-White Metal, he discussed key differences in the descriptions of surface cleanliness. Among other points, he stated that the ISO 8501-1 standard only provides a one-sentence definition, leaving room for interpretation and debate, while the SSPC/NACE joint standard provides a five-page document with clear instructions, definitions, and additional reference documents. He concluded that, in his opinion, specifiers across Europe should start looking at the SSPC/NACE joint standards to move forward in finding a happy medium and perfecting the industry standards.

Rob Francis, Aurecon, South Melbourne, Australia, responded to Wilson's article in a letter to the editor of *JPCL*. As is *JPCL* policy, *JPCL* invited the author of the article to respond. Lee Wilson's answer follows Rob Francis' letter.

JPCL reserves the right to publish letters at the editor's discretion and to edit letters for length and style.

For the readers' reference, the following standards and reference documents are discussed in the letters.

- SSPC-SP 5/NACE No. 1, "White Metal"; SSPC-SP 6/NACE No. 3, "Commercial"; SSPC-SP 7/NACE No. 4, "Brush-Off"; SSPC-SP 10/NACE No. 2, "Near-White"; SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning"
- ISO Sa1, "Light"; ISO Sa2, "Thorough"; ISO Sa2.5, "Very Thorough"; ISO Sa3, "Pure Metal"
- AS1627.4, Class 1, "Light"; Class 2, "Medium"; Class 2.5, "Near-White"; Class 3, "White Metal"
- SSPC-VIS 1, "Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning"
- SSPC-VIS 2, "Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces"
- SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel"
- ASTM D610, "Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces"
- ISO 4628-3, "Paints and varnishes—Evaluation of degradation of coatings—Designation of quantity and size of defects and of intensity of uniform changes in appearance—Part 3: Assessment of degree of rusting"

To participate in this conversation, find Wilson's article at www.paintsquare.com/jpcl, and add your comments in the space following the article. *JPCL* reserves the right to moderate all comments. Comments can also be e-mailed to Karen Kapsanis, editor, *JPCL*, at kkapsanis@protective-coatings.com.

Wider Use of Joint Standards Not the Answer

To the Editor: Lee Wilson's article on surface preparation standards in the March 2011 *JPCL* was timely. As another NACE CIP presenter, I also find participants are understandably confused and bemused by the numerous standards in use around the world. However, I am not convinced that adoption of the joint SSPC/NACE standards would necessarily clear matters up. There are a number of concerns with this approach.

1. We must not lose sight of the fact that surface preparation standards are not an end in themselves; we select a coating system for a given application, and the required standard of blast cleaning follows from this. Blast cleaning rarely stands alone. There are three main situations:

- High quality coatings in severe environments (immersion, chemical exposure, etc.), which require the cleanest surface with no visible traces of contamination
- High quality coatings to provide extended protection in atmospheric environments, which require very clean surfaces but can withstand traces of adherent contamination
- Lesser quality or surface-tolerant coatings for mild environments, which handle significant adherent contamination

Really, three standards of visual cleanliness after blast cleaning to meet these coating requirements are all that are

Continued

required. These would be the current SSPC-SP 5/NACE No. 1/ISO Sa3 for the first situation; SSPC-SP 10/NACE No. 2/ISO Sa2.5 for the second; and SSPC-SP 6/NACE No. 3/ISO Sa2 for the third. If you look at a supplier's product data sheets, you will generally find that one of these three "families" of blasting is normally specified. The new SSPC-SP 14/NACE No. 8, Industrial Blast Cleaning, is unnecessary and, as far as I am aware, not specified by any coating supplier for their product.

2. I would agree that the written descriptions in ISO 8501-1 for the classes of blasting are not clear, are limited, and are far from perfect. We are lucky in Australia because we have a separate written standard (AS1627.4), which provides a more detailed description of the classes, as well as other information on blasting similar to that in SSPC-PA 1. ISO 8501-1 is used mainly for its reference photographs. However, the SSPC/NACE standards are not without problems. Each class of cleaning is a separate document with much repetition, making them cumbersome to use. The definition of "staining" is not clear. The term "shadowing" is incorrectly used (a shadow is a lighting effect, not actual contamination). The Near-White definition allows up to 5% staining, but no inspector or contractor would accept this degree of contamination (have a look at 5% contamination in SSPC-VIS 2, ASTM D610, or ISO 4628-3).

3. Lee included a table showing "equivalence" between ISO and the joint standards, as we used to teach in the NACE inspection course. In the new version of this course, the authors have deliberately withdrawn this, implying that there is no equivalence. I would disagree, certainly with the two (most important) highest quality standards. I cannot imagine a surface blasted to an ISO Sa3 that would not meet SSPC-SP 5/NACE No. 1 and vice versa, nor for the next "near-white" or "thorough" grade. (However, this would not be true for the next grade down.)

The ideal situation would be for both committees to discard the current classes and use new ones. A, B, and C would be ideal for the three classes above if they were not already used for initial rust grades. You could then have slight variations, such as AA, A+, or A- to allow for any new requirements. For example, in the future, some device like a gloss meter might be developed to quantify visual cleanliness, and such figures could be related to these. However, such an approach is unlikely.

The best short-term compromise would be for both the ISO and SSPC/NACE committees to include a clause in the next updates of their standards noting that Sa3 is equivalent to SSPC-SP 5/NACE No. 1 and that Sa2.5 is equivalent to SSPC-SP 10/NACE No. 2. (What to do about the next grade is more difficult but less important.) This would formally recognize what most inspectors, contractors, and coating suppliers currently

know to be the case; remove some confusion; and move a small step closer to a unified standard—surely a worthwhile move.
Kindest regards,
Rob Francis—Aurecon, South Melbourne, Australia

The Author Responds

Rob, thank you kindly for your comments on the article. I believe that your comments prove precisely the point that I was trying to portray, in that there is certainly confusion within the industry and considerable room for debate.

The point of the article is to forget about equivalents and specify a given standard, preferably the best one suited to the project (i.e., the one with the most information and the easiest to understand). Should we try to incorporate, classify, and blend standards, then we simply continue on the same cycle, which has ultimately led to the chaotic situation that the industry is now in. In my opinion, the blending of standards or the suggested classification (i.e., A, B, and C) would only result in further standards in circulation trying to govern the requirements of the same thing, which, in my opinion, is precisely what we should be trying to avoid.

I deliberately pointed out that it is the industry that views the ISO8501-1 standards and the joint standards as equivalents. I purposefully did not say that SSPC/NACE do. With this in mind, I would have to say that I completely understand as to why both societies would not wish to be seen as equivalents to any other standard and would have to disagree with classing the joint standards and the ISOs as equivalents! Simply put, how can you compare a sentence to five pages of written text and a quantifiable requirement to, and I quote, "Any remaining contamination will show as slight staining in the form of spots and stripes"?

As an example of how equivalents can create potential mayhem, let us say that the specification calls for blast cleaning to a standard of Sa2.5 as in ISO 8501-1 or equivalent. The inspector recognizes this as equivalent to a SSPC-SP 10/NACE No. 2 and therefore requests the 5% contamination over a given area rule for acceptance criteria. I will leave it up to you to appreciate the heated debates that can and do ensue once the contractor plays the slight staining in the form of spots and stripes card, and rightly so. This does happen. Why? "Because of equivalents." It results in one thing—chaos in the field where it really counts.

The problem here does not lie with the joint standards but with ISO's reluctance to include a quantifiable degree of contamination for acceptance criteria. This would certainly prevent confusion in the field. One would have to ask, if the ISO 8501-1 standards contained the same quantifiable contamination levels for acceptance criteria, would SSPC/NACE be less reluctant to consider the ISO's as equivalents?

Continued

I would agree that the joint standards are far from perfect, but we would have to agree on the simple fact that they are ahead of the current standards in circulation. For this reason, I suggest a wider adoption of the joint standards.

Regarding your comments: "The Near-White definition allows up to 5% staining, but no inspector or contractor would accept this degree of contamination (have a look at 5% contamination in SSPC-VIS 2, ASTM D610, or ISO 4628-3)."

I would agree the pictorial reference is far from perfect within SSPC-VIS 1, but we have to remember that it is the written standard that takes precedence over the pictorial standard, hence another huge benefit of the joint standards! As the article clearly stated, we are provided with a quantitive guide (i.e., 5% of staining over a 7.6 x 7.6 cm area). If the standard achieved is less than this figure over the given area, then neither the inspector nor the contractor have an argument. The ISO standards, as well as numerous others, do not give the inspector or the contractor this option. Remember, we ask for no more or no less than the standard/specification requirements.

I believe that many within the industry would disagree with abolishing the SSPC-SP 7/NACE No. 4 (Brush-Off Blast) standard, and rightly so! This standard has been instrumental for inspectors and contractors on a global scale. The tightly adherent requirements alone for a brush-off blast are well worth the incorporation of this standard, particularly in the marine sector where this has proved a saving grace on many a vessel dry docking project with large surface areas often prepared to the brush-off standard. Of course, this is only one example, and there are many others. As you stated, "We must not lose sight of the fact that surface preparation standards are not an end in themselves; we select a coating system for a given application, and the required standard of blast cleaning follows from this." For this reason, I personally believe that the SSPC-SP 7/NACE No. 4 certainly has its place.

I believe that the debate regarding the surface preparation standards will continue for many years, and hopefully a resolution between the standard bodies will eventually be made. However, until that point, I believe that wider adoption of the joint standards and the specifying of a single standard by coating engineers is the way to move forward.

Thank you for your comments.

Best regards,

Lee Wilson

A Study of Rapid-Cure, Slip-Resistant Coating Systems on Ship Decks

By Ki-Hong Kim, Dae-Young Kim, and Yong-Yeol Park, Hyundai Heavy Industries Co., Ltd., Ulsan, Korea, and Yun-Dong Kim, Defense Agency for Technology & Quality, Busan, Korea

Slip-resistant coatings have been applied mainly to the floors of hallways in marine vessels to prevent crew members from slipping and injury. Early coating specifications required 5–7 layers of general epoxy coatings to be applied. Because of the development of high-build epoxy resins, high-build, solvent-free epoxy coating specifications that require only three layers have been introduced. Application of slip-resistant, solvent-free epoxy coating was a time-consuming process, taking as long as 4–7 days due to the long drying period, especially at lower temperatures. The drying time resulted in a delay in the construction process. Another weakness of the epoxy coating was low elongation, which could induce cracks and delamination when used in highly stressed areas such as the exposed (weather) deck of the ship (Fig. 1).

To solve these problems, rapid-cure polyurea/urethane hybrid paints with higher fracture elongation were developed. This article discusses the characteristics of these coating systems for the highly stressed, exposed deck areas of marine vessels. The results of testing to verify the enhanced coating performance (e.g., fracture elongation and adhesion) are also given.

Coating Systems for Weather Decks

Various slip-resistant specifications are currently applicable to the exposed decks of ships. The typical overall thickness of the film coating for the exposed deck of marine vessels is >500 µm. This thick coating film is to protect the hull from corrosion and ensure resistance to mechanical damage. Table 1 (p. 26) presents a selection of slip-resistant coating systems.

Editor's Note: This article is based on a paper presented at SSPC 2011 featuring GreenCOAT, the conference of SSPC: The Society for Protective Coatings, held January 31–February 2, 2011 in Las Vegas. The original paper is published in the SSPC 2011 *Proceedings,* which can be purchased from SSPC (sspc.org).

Epoxy Coating Systems

The epoxy-based coating specifications are applicable to both the bridge decks of submarines and the exposed decks of surface ships. The typical epoxy coating system usually consisted of 5 to 7 layers including a primer coat (inorganic zinc), an intermediate coat (epoxy), a topcoat (urethane), sand strewing (or broadcasting for slip-resistance), and a finish coat (urethane); however, the new epoxy coating system that has been widely employed is a three-coat, thick-film epoxy coating system, composed of a primer coat (epoxy), an intermediate coat (solvent-free epoxy) containing Al_2O_3 for slip resistance, and a finish coat (urethane).

(Left):The guided-missile cruiser USS Anzio (CG 68) is underway in the Atlantic Ocean during rough seas. Anzio is deployed as part of the George H.W. Bush Carrier Strike Group supporting maritime security operations and theater security cooperation efforts in the U.S. 5th and 6th Fleet areas of responsibility. (U.S. Navy photo by Mass Communication Specialist 3rd Class Brian M. Brooks/Released)

Fig. 1: Delamination failure case of slip-resistant coating film on the exposed deck of a marine vessel. Figs. 1-7 courtesy of the authors

Polyurea/Polyurethane Hybrid Coating System

The polyurea/urethane coating specifications call for two coats: a primer coat and a finish coat. The drying time of this system is far shorter than that of the high-build epoxy coating system, thus reducing the work period.

A urea coating is produced by combining an isocyanate group (R-NCO) with an amine group (R-NH), while a urethane coating is manufactured by combining an isocyanate group (R-NCO) with a polyol (ROH). The urea coatings are divided into the aliphatic group, aromatic group, and aspartic group, depending on the type of amine group, while urethane coatings are largely classified into the acrylic group and the alkyd group. A polyurea/urethane hybrid coating is a mixture with a certain ratio of urea and urethane resins.

Experimental Procedure

Formulation of Polyurea/Urethane Coating

Two types of polyurea/urethane hybrid coating mixtures with different levels of urea content were formulated, including aluminum oxide as non-slip aggregate. Polyurea/urethane A had a lower urea content.

Preparation of Coating Specimens

Free films and coated specimens were prepared for the assessment of fracture elongation (tensile strength) and adhesion strength. To determine the effect of surface preparation on the adhesion strength of the coatings, some were applied over power tool-cleaned steel, and others were applied over abrasive blast-cleaned steel.

Free film specimens with dimensions of L70mm x W10mm x T2mm (length x width x thickness) were prepared for tensile strength (elongation) testing (Fig. 2). Coated specimens (hybrid coatings) with dimensions of L300mm x W30mm x steel plate thickness 5mm/coated layer thickness 2mm were also prepared for tensile strength testing (Fig. 3). Steel plates were prepared to the surface cleanliness grade Sa 2.5 using abrasive blasting.

Coated specimens for adhesion testing were prepared on steel plates after either power tool-cleaning or abrasive blasting (Fig. 4), according to the following procedure.

1) Cleaning of steel substrate and removal of skid-resistant tape previously attached
2) Surface preparation for coating with grit blast (Sa 2.5) and power tools (St 3)
3) Application of epoxy primer coating (70 µm) using airless spray
4) Drying of coating (1 hr, 10 C)
5) Application of polyurea/urethane finish coating (1500 µm) using a roller and drying of coating (6 hrs, 6–8 C)

Verification of Coating Performance

Tensile strength tests were conducted in accordance with ASTM D2370-02, using the Universal Testing Machine (UTM). Adhesion tests were performed in accordance with ASTM D4541-02. In addition, film performance such as coefficient of friction, impact resistance, accelerated aging by light and water, and accelerated corrosion tests were conducted in accordance with MIL PRF-Z4997C.

Results and Discussions

Fracture Elongation of the Free Films

Coating formulation B (with higher polyurethane content) has a much higher fracture elongation than A, whereas the urea/urethane A (12 MPa) film has better tensile strength than the urea/urethane B (8.1 MPa). On the other hand, when it comes to elongation, the urea/urethane B result of 9.9% is better than that of the urea/urethane A (6.9%). In summary, the tests show that the urea/urethane A displays high strength but low elongation, while the urea/urethane B has properties of low strength and high elongation (Table 2). [*Editor's note:* Tensile strength-elongation curves for free films A and B are shown in the original paper in the SSPC 2011 *Proceedings*, sspc.org.]

Elongation data for free films of high-build epoxy could not be obtained because of the test specimens being

Table 1: Possible Selection of Slip-Resistant Coating Systems; High-Build Epoxy Type vs Polyurea/Urethane Hybrid Types

Items	H. B. Epoxy Type (µm)		Urea/Urethane Type (µm)	
Prime coat	Epoxy	150	Epoxy	100
Intermediate coat	High-build epoxy	1,500	—	—
Finish coat	Urethane	75	Urea/urethane	1,500
Total D.F.T		1,725		1,600

Table 2: Test Results of Tensile Strength

Products	Tensile Strength, MPa	Elongation, %
Urea/urethane A	12	6.9
Urea/urethane B	8.1	9.9

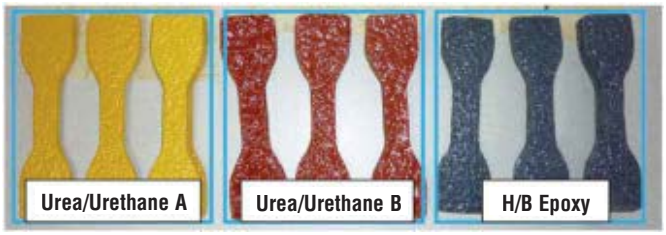

Fig. 2: Free film specimens for tensile strength test

broken, due to very low ductility, during installation on the tensile test machine (Fig. 5 on p. 28).

Fracture Elongation of Coated Specimens

During the drying of the thick-film epoxy coating (as typically applied to naval vessels), cracks (Fig. 6 on p. 28) had developed. Accordingly, they were excluded from the tensile strength test this time.

Test samples of SS400 steel were blast-cleaned (Sa 2.5, 50–75 µm) and painted and subjected to the tensile strength test. Both of the two materials (steel and film) developed cracks due to the stress that exceeded the tensile strength of the free films.

Therefore, the coatings on the surfaces of the steel produced non-load-carrying films and exhibited higher strength than the tensile strength of the free films. The crack-generating stress of the urea/urethane A was 237 MPa and that of the urea/urethane B was 261 MPa; the urea/urethane B, which showed higher elongation, also showed better elongation by 11%. Accordingly, the application of a paint with a higher elongation on a steel plate exhibits better crack resistance, but both coating materials are still judged to have resistance to the stress inflicted on the steel plate, exceeding an amplitude of 12 MPa. [*Editor's note:* Tensile test results of the coated specimens are shown in a graph in the original paper, SSPC 2011 *Proceedings*, sspc.org.]

The results of the assessment of fatigue on film using the test samples reveal that the fatigue of the steel plate was about 190 MPa when it was subject to 2 million cycles of impact having 200 MPa while the film displayed lower fatigue strength than the steel plate when lower stress, i.e. cyclic load exceeding 190 MPa, was applied. [*Editor's note:* Compared test results of fatigue strength of coated specimen vs. tensile strength of the base plate are shown in a graph in the original paper, SSPC 2011 *Proceedings*, sspc.org.]

Because most of the ships, however, are exposed to a lower repeated load of 190 MPa, it is judged that the fatigue of, and damage to, the film, were caused by cracks that were generated in the metal and transmitted to the film. [*Editor's note:* The test results of tensile strength in film are available from the authors.]

Fig. 3: Coated specimens for tensile strength test

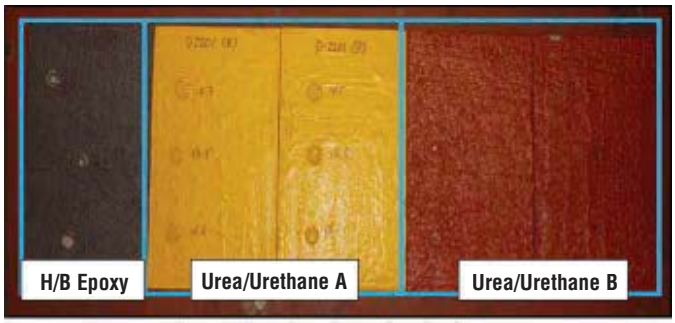

Fig. 4: Coated specimens for adhesion test

Adhesion Strength as a Function of Surface Cleaning Method

Adhesion measurements for the polyurea/urethane hybrid films and high-build epoxy were conducted on both steel plates that were either blast-cleaned or power tool cleaned prior to coating. The test results are summarized in Table 3.

The adhesion strength of the polyurea/urethane hybrid coatings showed more than 10 MPa on average for both the blast-pretreated test pieces and the power tool-pretreated test samples. Adhesion strength of the high-build epoxy coating on the blast cleaned substrate showed an average of 3.3 MPa but had no adhesion on the power tool-cleaned surface.

Coating Performance Assessment

The film performance test was conducted in accordance with MIL-PRF-24667C. This assessment consists of 14 test items including abrasion, impact resistance, and flash point, some of the results of which are summarized in Table 4. The table shows that the films meet the requirements of the MIL-PRF-24667C for friction coefficient, the most important factor required in slip-resistant coatings, and most of the rest of the test items. Drying time is less than three hours, which is excellent; however, pot life is shorter at 1.5 hours than the standard (more than 2 hrs).

Trial Applications of the Hybrid Coatings to Marine Vessels

An actual application was made on the bridge deck of a submarine to verify the feasibility of the application of polyurea/urethane hybrid systems. The application procedure was as follows:

1) Surface treatment (removal of old coatings) and cleaning to St 3 (Fig. 7(a));
2) Application of primer coating

Table 3: Test Results of Adhesion

Cleaning Method	Blast cleaning				Power tool cleaning			
Specimen No.	#1	#2	#3	Aver.	#1	#2	#3	Aver.
High-Build Epoxy	3.6	4.3	2.0	3.3	No adhesion			—
Urea/Urethane A	12.7	13.5	14.6	13.6	14.5	12.8	14.5	13.9
Urea/Urethane B	9.6	10.6	10.3	10.2	11.9	9.6	9.2	10.2

Table 4: Test Results for Film Performance

Test Items		Criteria	Urea/Urethane A	Urea/Urethane B
Coefficient of friction	Dry	0.95	1.86	1.98
	Wet	0.90	1.85	1.67
	Oily	0.80	—	—
Impact resistance (%)		Min. 95	No defect	No defect
Accelerated aging by light and water		No loss	No defect	No defect
Accelerated corrosion		Max. 9 mm	No defect	No defect

Fig. 5: Broken tensile specimen of high-build epoxy free film during installation

(epoxy paint, 70 µm) and drying (natural air) for one hour at 15 C;
3) Application of finish coating (polyurea/urethane hybrid paint), 1500 µm by roller (Fig. 7(b)); and
4) Air drying for 6 hours.

Conclusions

Based on the study of the application of polyurea/urethane hybrid coatings to the marine vessels, the following conclusions were made.
1) Polyurea/urethane hybrid coatings show higher fracture elongation than the corresponding high-build epoxy coating, suggesting that the hybrids have higher cracking resistance against the hull deformation. The adhesion of the polyurea/urethane hybrid coatings to the steel plate was also higher than that of the epoxy coatings over the power tool-treated surface, suggesting the hybrids have higher tolerance to the surface treatment for the coating application.

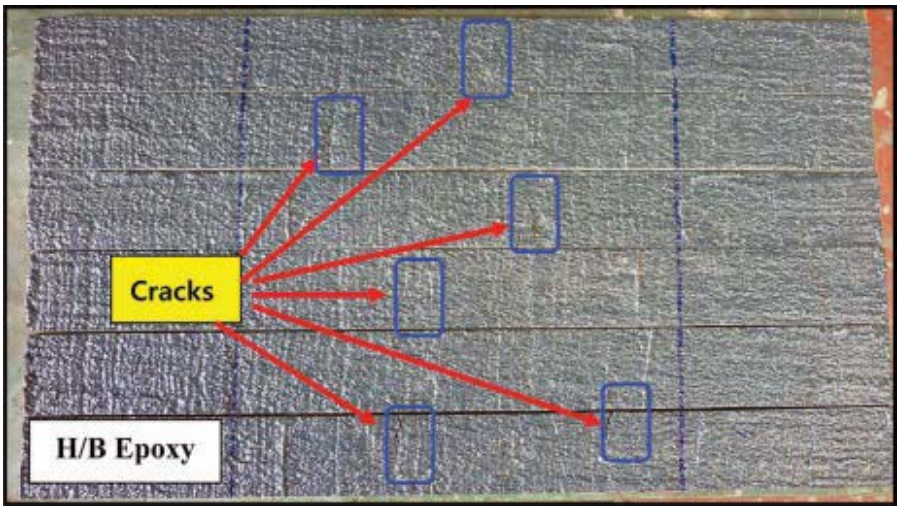

Fig. 6: Cracks developed during the drying time on the test specimens

2) It was verified that the performance of the polyurea/urethane hybrid slip-resistant coatings should be suitable for the exposed decks of naval ships and the Heli-decks of FPSOs through the trial application.

References

1. MIL-PRF-24667C, "Coating System, Non-skid, for Roll, Spray, or Self Adhering Application," NAVSEA, 2008.
2. Albert Holder, "The Many Possibilities of Polyurea," NSWC Carderock Division, 2002.
3. MIL-STD-1623, "Fire Performance Requirements and Approved Specifications for Interior Finish Materials and Furnishings (Naval Shipboard Use)," NAVSEA, 2010.
4. C. G. Munger, "Corrosion Protection

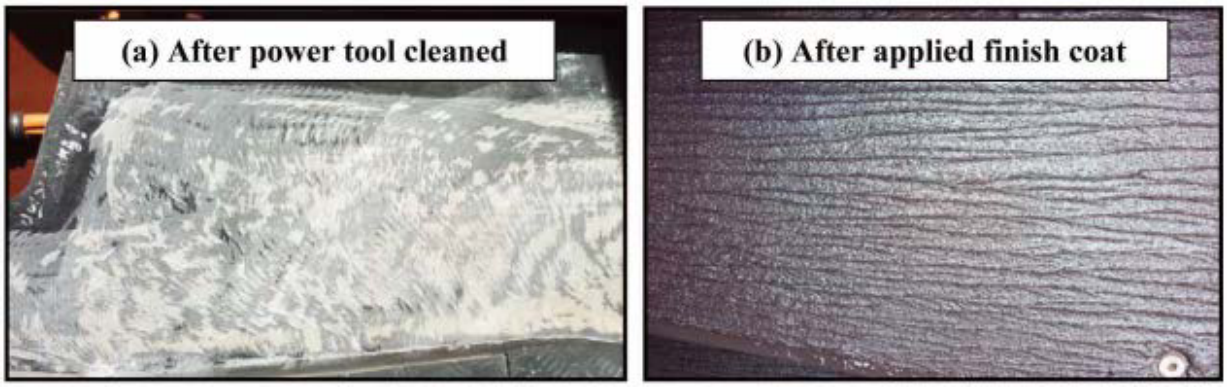

Fig. 7 (a) and (b): Appearance of the power tool-cleaned surface

by Protective Coatings," 2nd edition, NACE, p. 223-225, 1999.
5. ASTM D4541-02, "Pull-Off Strength of Coatings Using Portable Adhesion Testers," ASTM, 2002.
6. Ki-Hong Kim, "A Study on Application of Fast Cure Non-skid Coating System to Navigation Deck of Submarine," Hyundai Heavy Industries Co., Ltd., 2009.

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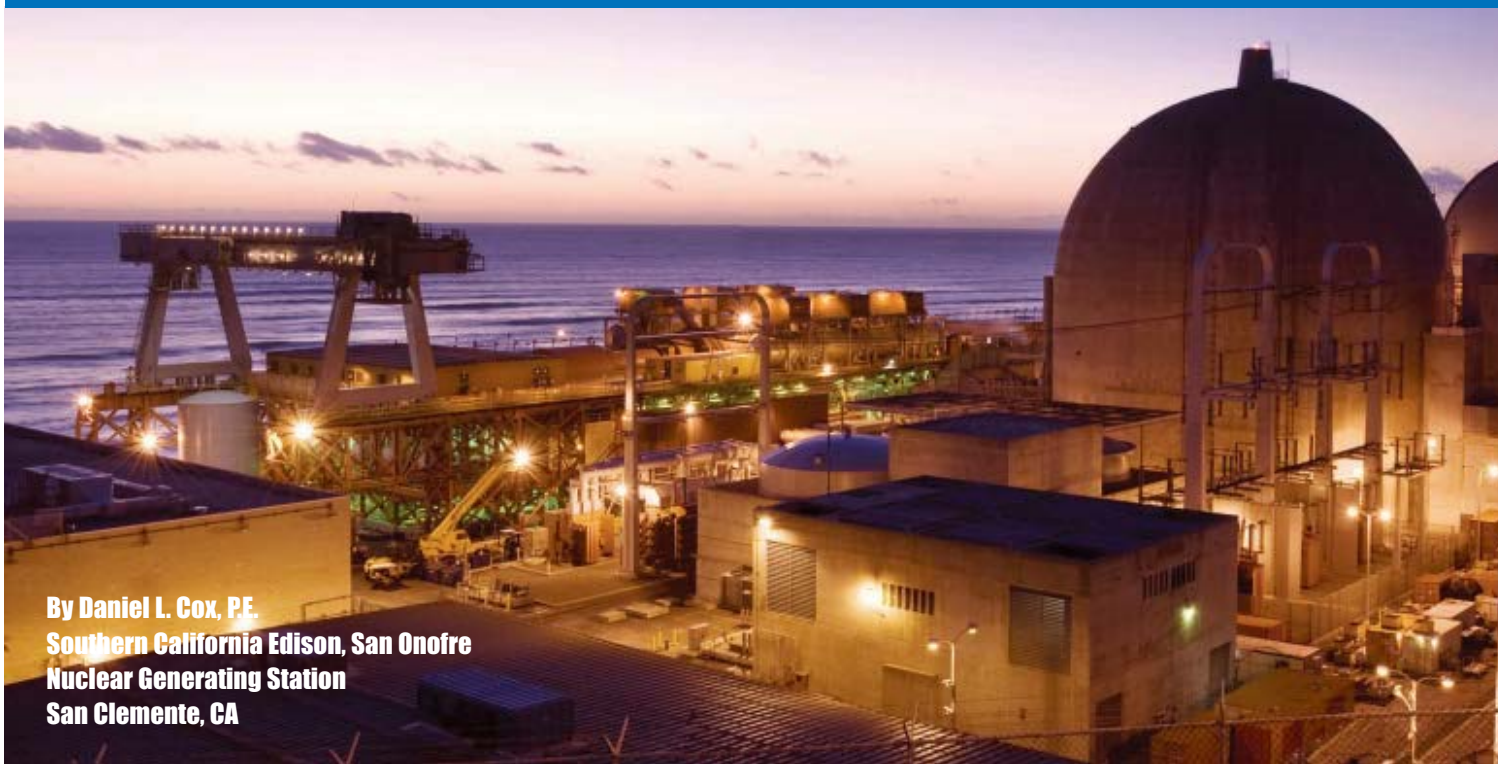
He has experience in structural design and analysis of combatant ships and submarines and inspection of submarines. He holds a BS in naval architecture and ocean engineering from Pusan National University in South Korea.

Yun-Dong Kim is a senior researcher in the naval sea systems field of Busan Regional Center at the Defense Agency for Technology and Quality (DTaQ). He is also a government quality assurance representative for naval vessels.

He has 23 years of experience in quality assurance and paint inspection of naval vessels. He holds a bachelor's degree in mechanical design engineering and a master's degree in mechanical engineering from Busan National University in Korea, and is a member of the Corrosion Science Society of Korea.



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Coatings Program Requirements at Nuclear Power Plants

Contract coatings work in the commercial nuclear industry is quite different than coatings work in other industries, even though the physical coatings work at a nuclear power plant (NPP) does not differ from the coatings work at any other facility. In particular, the regulatory, administrative, quality, and qualification requirements can differ substantially from those of other industries. This article describes the basic elements of contract coatings work in nuclear coatings programs that coating applicators or inspectors must understand to obtain work at nuclear power plants and to perform effectively in them.

Editor's Note: This article is based on a paper presented at SSPC 2011 featuring GreenCOAT, the conference of SSPC: The Society for Protective Coatings, held January 31—February 3, 2011. The original paper is published in the SSPC 2011 Proceedings (www.sspc.org).

Background

The requirements of nuclear coatings programs are quite detailed. Three or four classifications (coatings service levels) of coating systems are defined. These classifications are based on where the coatings are applied in the NPP and on the potential impact a coating may have if it were to fail in service.

Coating applicators or inspectors must have a basic understanding of the following key elements of a nuclear coatings program:

- Regulatory requirement and licensing basis
- Coating service levels
- Procedures and programs
- Personnel training and qualifications

With a general understanding of the above elements, coatings contractors can have more success obtaining work in the commercial nuclear industry, more effectively integrate themselves into the plant's organization, and perform the coatings work more efficiently.

Regulations and Licensing Basis

The commercial nuclear industry is heavily regulated; has constant oversight; and has periodic assessments by regulators, oversight groups, and industry peer groups. The U.S. Nuclear Regulatory Commission (NRC) provides guidance in a number of ways, for requirements (Code of Federal Regulations) or for recommendations (Regulatory Guides—but in some cases these are mandated).

All of the required (law) and committed regulatory guidance (either by mandate or choice) are considered part of the nuclear plant's Licensing Basis. This licensing basis for an operating plant is documented in the plant's Final Safety Analysis Report (FSAR).

The directly regulated coatings work is addressed in a section of the FSAR entitled "Organic Materials," which states that coatings used inside the containment are demonstrated to withstand the design basis accident conditions. The controlling regulation is Regulatory Guide

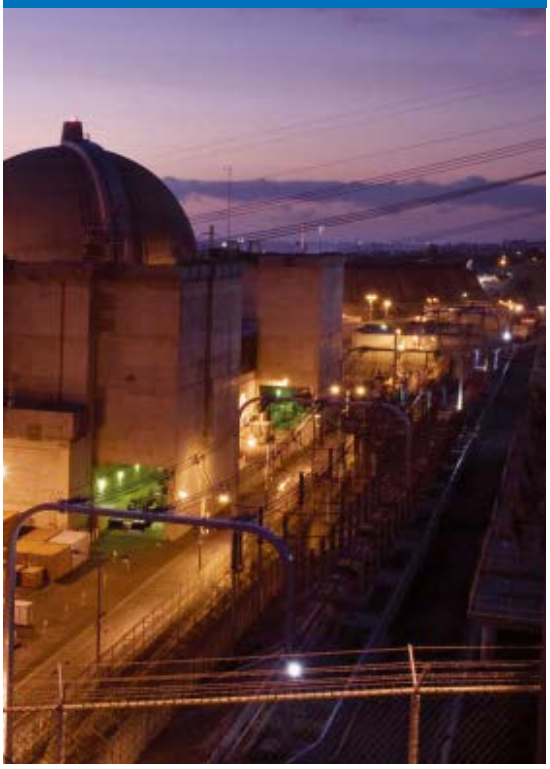

Photo courtesy of San Onofre's Communication Department

1.54. Rev. 0, Quality Assurance Requirements for Protective Coatings Applied to Water Cooled Nuclear Power Plants.[1] This Regulatory Guide refers to other standards from the American Nuclear Standards Institute (ANSI). These referenced ANSI standards—ANSI N101.4-1972, Standards for Quality Assurance Programs for Protective Coatings Applied to Nuclear Facilities;[2] ANSI N101.2-1972, Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities (DBA Analysis Standard);[3] and ANSI N5.12-1974, Protective Coatings (Paints) for the Nuclear Industry[4]—are the basis for testing and qualifying coatings for use inside containment.

In the late 1970s, the ANSI standards were withdrawn and replaced by a series of ASTM standards. Over the years, numerous ASTM standards were developed to address the contents of the ANSI standards. ASTM D5144, Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants,[5] was written to be the "road map" standard that provides program direction to the other associated standards. In a few (maybe 1 or 2) current plants, the licensing basis has been changed to allow use of more current standards.

Subsequent to the ASTM standards development, the NRC has revised Regulatory Guide 1.54 (Revision 1) to reference these standards, stating: "ASTM D 5144-00 and the other ASTM standards discussed below provide guidance on practices and programs that are acceptable to the NRC staff for the selection, application, qualification, inspection, and maintenance of protective coatings applied in nuclear power plants."[6] As a result of the Revision, these few existing plants have committed to Reg Guide 1.54, Rev 1, and the ASTM standards as their licensing basis for coatings. The latest revision, Reg Guide 1.54, Rev 2,[7] and the current ASTM standards will be the licensing basis for future plants.

Plant Programs and Procedures

At a commercial nuclear facility, a detailed program and set of procedures govern the coating process. The standards discussed above already address the requirements for coatings work inside the containment building. Outside of containment, almost all of the current operating plants have no regulatory requirements for the coatings applied to other systems, structures, or components. The plants do, however, have program and procedural controls for all coatings. In the controls, the coating service level descriptions play an important role.

Photo courtesy of the author

Classification of Coatings

The program and procedural controls vary from plant to plant, but all have the same basic intent. The three defined classifications of coatings are

- Coatings Service Level I—Inside containment,
- Coatings Service Level II—Decontaminable coatings, and
- Coatings Service Level III—Safety-related (required for safe shutdown of the facility) outside containment.

Coatings Service Levels I, II, and III are defined in ASTM D4538,[8] Terminology Relating to Protective Coating and Lining Work for Power Generation Facilites, and are used in many of the current ASTM Standards. There may be variations on what the classifications are termed at each facility, and there may be additional classifications, such as Industrial or Balance of Plant. Almost all plants have an "Industrial or Balance of Plant" classification, but no ASTM standard defines this classification. "Industrial or Balance of Plant" coatings are coatings that are applied to the remaining plant systems, structures, and components for immersion service, chemical resistance, corrosion, or erosion protection.

The term "safety-related coating system" is a coating system used inside or outside of the reactor-containment, the detachment of which could adversely affect the safety function of a safety-

related structure, system, or component (SSC).[8] The program procedural controls and specifications for the selection and application of these coatings (Service Levels I and III) are more stringent than the remainder of the plant's coatings. Coatings Service Level III, for the most part, means immersion coatings in safety-related systems, e.g., tanks, heat exchangers, piping, and valves. These controls vary depending on the coating use and the system structure or component's importance to the nuclear plant.

"Balance of Plant or Industrial" coatings, though the least important from a plant perspective, are still controlled. Many of these controls are based solely on normal selections parameters, the intended substrate, and operating environment. Another control may be solely that a particular coating system is a plant's preference.

Coating Specifications and Procedures

Specifications and procedures for the coatings and coatings applications will also vary but are much the same in that they follow applicable standards (NACE, SSPC, and ASTM) and the manufacturers' product data sheets. All of the coatings work will be performed by the responsible work organization under some type of work order that uses the specification and application procedure as the basis for application. All work orders will require documentation of many of the steps and critical attributes of the coatings job. The level of documentation will vary from plant to plant and from classification to classification. The documentation will be substantially more than is required in most industries.

Personnel Training and Qualifications

In addition to regulator requirements, specifications and procedures, coating classifications and the like, training and qualifications for the personnel is another key element to the coatings program. Training requirements for personnel involved in the coating work within the commercial nuclear industry vary substantially from other industries. Training programs requirements have a regulatory basis, but the specifics are not necessary to discuss. Rather, it is important to know that there are training requirements, such as those found in ASTM D4227, Coating Applicators for Application of Coatings to Concrete Surfaces,[9] and ASTM D4228, Coating Applicators for Application of Coatings to Steel Surfaces.[10] All plants will have specific training for in-house painters and contract painters. The training may vary from plant-to-plant. Some plants may require contract painters to attend training on many aspects of the

coatings work, from surface preparation to coating application to inspection, and may have different classes for substrates or coatings classifications.

Some of the training for surface prep, application, and inspection of coatings may seem a little unnecessary for qualified painting contractors, but, in most cases, training is as much about knowing the facility's programs and procedures as it is about actually performing the task. In addition to training, there will most likely be hands-on demonstrations or performance tests.

All plants use testing along with the training portion to document the qualifications of each worker for each task that he or she is qualified to perform. Typically, proof of the qualifications of each painter will have to accompany each work order assigned.

Conclusion

Commercial nuclear facilities are heavily regulated and have detailed coatings program requirements. There will be new regulations, new terminology, new programs and procedures, new training, and documentation. All of these requirements are designed first and foremost to ensure the coating systems applied comply with each facility's licensing bases. That is, the correct coating system classification is selected and applied in accordance with approved standards and controls by properly trained and qualified personnel. This process may be quite different than any other industry where one would simply expect to hire professional contractors to apply the right coatings for the job and have quality results. In the commercial nuclear industry every aspect of the coatings program is documented to validate adherence to the coatings program.

Once you are at the jobsite with the tools in hand and the correct paperwork to support and guide the job, your coating work is no different than in other industries—it only feels that way. However, you must understand that the programs and processes are as important as the physical work.

References

1. Reg. Guide 1.54, Rev 0, Quality Assurance Requirements for Protective Coatings Applied to Water Cooled Nuclear Power Plants
2. ANSI N101.4-1972, Standards for Quality Assurance Programs for Protective Coatings Applied to Nuclear Facilities
3. ANSI N101.2-1972, Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities (DBA Analysis Standard)
4. ANSI N5.12-1974, (Supersedes N5.9-1967) Protective Coatings (Paints) for the Nuclear Industry

5. ASTM D5144, Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants
6. Reg. Guide 1.54, Rev. 1, Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants
7. Reg. Guide 1.54, Rev. 2, Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants
8. ASTM D4538 - Terminology Relating to Protective Coating and Lining Work for Power Generation Facilities
9. ASTM D4227 - Coating Applicators for Application of Coatings to Concrete Surfaces
10. ASTM D4228 - Coating Applicators for Application of Coatings to Steel Surfaces

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Cox is an active member of ASTM Committee D33, Protective Coatings and Linings, and the utility chairman of EPRI/PSE Nuclear Utility Coatings Council (NUCC). He was the recipient of the EPRI 2007 Technology Transfer Award for Methodology for Containment Coating and Adhesion Testing.

He has a BS in chemistry and a MS in nuclear engineering.

JPCL

By Brian Goldie, *JPCL*

Photo courtesy of NuernbergMesse© and Thomas Geiger©

Raw Material Suppliers Answer Calls for Green and Smart Coatings

At the end of March, the world's paint raw material suppliers met at the European Coatings Show in Nuremberg, Germany.

The bienniel show, which is the largest coatings event in Europe, had a record 26,000 trade visitors this year. Some 890 suppliers to the paint industry from 45 countries displayed their new and traditional products. At the parallel European Coatings Congress, 650 participants from 40 countries heard some 150 papers of outstanding interest in the topical issues of this highly innovative sector.

This review of the exhibition and conference discusses what the developments in new products and technologies mean to users of protective coatings and what users can expect in new paints or improved performance. The properties described in the review are based on comments and data sheets from suppliers and have not been independently verified.

Trends: Green, Waterborne, and Smart

Most new products from coating raw material suppliers at the show are based on ingredients from renewable or sustainable resources. The concept of "green" products, even the color theme, was carried over in a number of stand designs.

The reliance on fossil fuels as sources

of raw materials for coatings is shifting to a reliance on natural products, with suppliers also being sensitive to the need to not affect the use of these materials in the human food chain. For example, suppliers that incorporate soya-based ingredients into their raw materials are aware of the effects on the supply of soya ingredients because they are a major source of nutrition for many countries.

Although new products for high-solids are still in demand, an underlying trend at the show was an increasing emphasis on waterborne systems rather than high(er) solids as a means of meeting the more stringent regulations on volatile organic compound (VOC) content in coatings.

A third trend was an increasing number of smart, or functional, coatings developments on display.

Resins and Curing Agents

The major raw material suppliers—BASF, Bayer, and Dow—all exhibited their comprehensive product ranges for a wide variety of industries.

The industrial coatings market is one of the most diverse that BASF serves, and it introduced two more products.

- Basonat® LR 9080, a waterborne, fast-drying polyisocyanate mainly for general industrial coatings, allows faster handling of the coated substrate.
- Acronal® PRO 80, a modified acrylic dispersion for metal primers, not only offers high-performance corrosion protection but it also is free of alkylphenol ethoxylates (APEO).

APEOs are non-ionic surfactants with an emulsifying and dispersing action that makes them suitable for a very large variety of applications; however, APEOs, especially nonyl phenol ethoxylates, are considered very toxic for aquatic life and, in Europe, are no longer allowed or wanted.

Polyurethane coatings formulated with Bayer raw materials are already found in a wide range of applications; however, the company's latest developments go even further as coatings increasingly take on new functions. Bayer's and other suppliers' new polyurethane products and developments will be detailed in the next issue of *JPCL*.

The Dow Chemical Company's five businesses combined to demonstrate the benefits of the company's latest technological advances in their industries. Dow Construction Chemicals introduced white reflective roof coatings, a new technology to reduce overheating in buildings. At the top of most agendas in today's building industry is the drive to create products that are more sustainable and take maximum advantage of ways to save energy. To this end, one of the main areas promising significant progress is roof technology, specifically, the development of coatings aimed at lowering building temperatures caused by radiant sunlight.

After many years of study into the indoor temperature effects of direct sunlight, Dow Construction Chemicals developed and, at the show, highlighted its latest innovations in its "cool roof" technology program: reflective elastomeric coatings that are durable and efficient, with the potential of making the single largest contribution to reducing CO_2 emissions from domestic, commercial, and industrial buildings. In addition, the cool roof coatings are designed to play a significant role in extending the longevity of structural roofing materials.

Another company promoting cool roofing was Arkema. It showcased its polyvinylidene fluoride (PVDF) resins for long-life coatings dedicated to cool roofing. The company also featured its very low VOC acrylic emulsions.

The Huntsman Performance Products division brought two new fast cycloaliphatic amine-curing agents to the market. XTA-801 and DCH-99,

Approximately 150 papers were presented during the European Coatings Congress. Photos on pgs. 39-45 are courtesy of NuernbergMesse©.

which offer low viscosity, low color, and high reactivity, are designed for use in coatings, flooring, and other applications. When combined with the company's Jeffamine® polyetheramine (PEA) hardeners, the new curing agents can enhance glass transition temperatures, modulus, and hardness, and can improve chemical resistance as well as low temperature curing properties. The company also introduced a PEA epoxy curing agent that offers low viscosity, low color, higher glass transition temperatures, and faster property development than other solutions typically available. Another new product from

A record 26,000 people attended the exhibition.

Huntsman is a cycloaliphatic amine chain extender for polyurea spray. The extender is designed to be easy to use and environmentally friendly.

From Wacker came product innovations and customized solutions for industrial coatings, construction, and adhesives and sealants. It also unveiled SILRES® IC 368, a liquid, solventless silicone resin intermediate for highly weatherable coatings. The new silicone resin is formulated so that an addition of just 15% increases the UV resistance and weatherability of the organic binder in the coating system without impairing the mechanical properties of the system.

Lab and open-air weathering tests show that SILRES® IC 368 confers much better gloss retention, superior weatherability, better heat resistance, and a longer service life compared to similar products. Designed to be highly versatile, the new intermediate is suitable for modifying alkyd resins, hydroxy-functional acrylic resins, and hydroxy-functional polyesters commonly used in industrial coatings for metal, including coil coating.

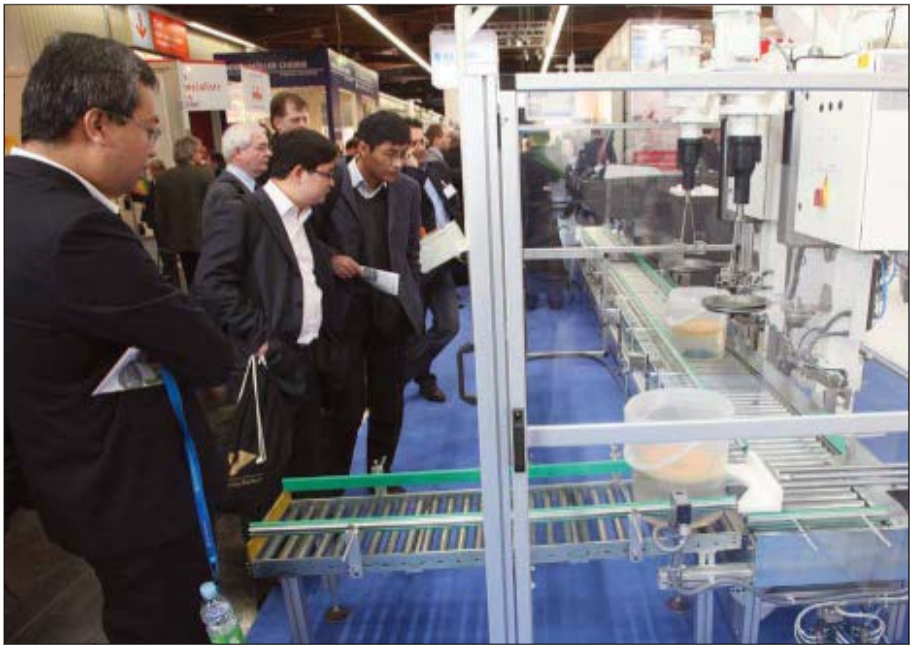
Perstorp Holding AB's Voxtar™ is, according to the company, the world's only renewable pentaerythritol platform. Voxtar™ cuts a carbon footprint by up to 75% compared to that of conventional fossil-based penta and di-penta polyols while providing identical properties and performance. It is made from bio-based acetic aldehyde and formaldehyde. Combining the renewability of Voxtar™ with the latest waterborne technology significantly shrinks the carbon footprint of high-solid alkyd paints and alkyd emulsion paints compared to traditional petroleum-based latex paints.

The product also exemplifies the company's efforts to reduce emissions and energy consumption associated with raw material manufacturing—Perstorp uses renewable raw materials such as bio methanol to decrease the use of petrochemical raw materials. Moreover, renewable energy has been powering parts of the company's production sites since 1991, and more than 80% of its R&D work is focused on environmental innovation.

Perstorp's approach to innovation is driven by sustainability on three fronts: reducing emissions and energy consumption in raw material manufacturing; developing products that enable customers to formulate low-environmental impact solutions; and high-performance additives that enable more durable and long-lasting end products.

Omnova Solutions, together with its recently acquired Eliokem, is a significant supplier of styrene butadiene latices, acrylic emulsions, bio-based polymers, and additives. The company presented a new range of hydrophobic acrylic emulsions under the Omnapel™ name. The emulsions exhibit exceptional water resistance, good exterior durability, and other resistance properties, making them useful in water-resistant coatings such as concrete sealers. In addition, they can be blended with other polymer systems to enhance water resistance and durability. Some of the products can be used to create coatings that, when cured above 135 C, are insoluble to acids, alkalis, and organic solvents.

Incorez introduced a waterborne epoxy curing agent—Incorez 148/604—to help companies comply with the requirements of the VOC Solvents Emissions Directive, the European Union's main policy instrument for



Industry professionals check out new products from suppliers.

reducing industrial emissions of VOCs.

Charles Lynch, Commercial Manager at Incorez, commented on the launch: "Our new waterborne epoxy curing agent is a water soluble polyamine curing agent that is APEO, formaldehyde and solvent free, and so does not contribute to the VOC levels of the coating formulation. It is designed to produce very tough and durable, high-gloss waterbased coatings with both liquid and solid epoxy resins. In particular, this hardener displays very good compatibility with neat Bisphenol A type liquid epoxies, such as Epikote 828, to provide excellent hardness and cure development."

Croda Coatings & Polymers brought out its latest "green" innovation, Priamine 1071, for marine and protective coatings. Priamine 1071 is a low viscosity curing agent for epoxy systems. It can be used as a main curative and co-hardener, and it addresses a growing demand for the development of high-solids, low-VOC formulations. Due to its high flexibility and chemical resistance, this novel dimer diamine, bio-based building block is suitable for interior and exterior coating applications that require durability under severe conditions. Its sealant and protective properties as well as its improved adhesion properties can extend the service life of a coating.

Air Products featured its next generation of epoxy curing agents aimed at helping formulators design coatings solutions that benefit the environment and that are effective over a range of coating applications. Using its "Total Reactive Technology" approach, the company developed a modified polyamine curing agent that is 100% reactive (to epoxy resins) and that eliminates the need for a plasticizer. With its high performance and fast curing at ambient and low temperatures, the technology has already been successfully used for indoor flooring applications. The plasticizer-free technology is also more sustainable and has near negligible emissions throughout the lifetime of the coating. According to experts at Air Products, the new generation technology complements the increasing popularity of water-based systems.

Additives

"Green" again was the word when it came to new additives, but, as stressed by Byk Chemie, no global standard precisely defines "green" in the context of the surface coating industry. Everyone has a perception of its meaning, and the demand for "green" products keeps growing, hence the number of new developments. "Green" is also a synonym for "environmentally friendly," but what does that phrase mean? According to Byk, the VOC content of products and raw materials is one important indicator of their impact on the environment; however, the deciding factors are often the various eco-labeling systems in existence and the percentage of renewable materials in a product. Formulators often have to balance the use and type of "green" materials against performance requirements. With this in mind, Byk has developed products and technologies that meet current environmental standards without sacrificing the quality of the products being replaced.

New products on show included Byk-1740, a green defoamer based on eco-friendly and sustainable raw materials—vegetable oil derivatives. It is VOC-free and completely sustainable while providing the same performance as the standard mineral oil-based defoamers. Especially suitable for waterborne emulsion paints, the new defoamer has no negative influence on color or odor.

Other new Byk products exhibited for waterborne systems included silicone-free defoamers, defoamers free of mineral oil as well as silicone, and wetting and dispersing agents.

According to Clariant, it was one of the first companies to offer a 100% APEO-free alternative for manufacturing binder emulsion polymers. In addition to its low VOC levels, Emulsogen® EPA 073 is now one of few anionic emulsifiers with FDA approval. When combined with non-ionic emulsifiers like Emulsogen LCN 287 or Emulsogen LCN 407, these APEO-free emulsifiers offer increased

latex stability and better shelf life. They increase the availability of more environmentally acceptable alternatives to solvent-borne paints and coatings in contact with foodstuffs.

Rhodia is also moving toward more sustainable coatings with its portfolio of breakthrough performance additives created to meet formulators' demands for specific solutions for creating the next generation of eco-friendly coatings. The company highlighted its new eco-friendly evaluation approach to designing sustainable coatings by spotlighting its growing line of zero-VOC, APEO-free performance additives and solvents for waterborne coating. Rhodoline® OTE is a novel zero-VOC, APEO-free range of additives for extended open time (workability) in waterborne coating formulations. It provides a two- to four-fold increase in open time without the addition of solvents, thus giving painters longer to work overlays seamlessly or to touch up paint to correct imperfections such as drips and brush marks.

Air Products launched a new range of defoamers and de-aerators based on organic, silicone, and molecular chemistry that will allow manufacturers to produce high-performance coatings that are more durable, efficient, and environmentally friendly. The defoamers and de-aerators are particularly useful for waterborne systems and can be used in floor coatings in combination with the company's epoxy curing agent technology.

BASF also featured Dehydran® SE 2, a high-performance silicone polymer emulsion defoamer for premium waterborne paints and clear coats. It offers good foam suppression and long-term persistency, is highly compatible and easy to handle, and minimizes gloss reduction. Because Dehydran® SE 2 is VOC-free and has an ultra-low semi-volatile organic compound (SVOC) content, it also helps manufacturers formulate paints and clear coats that meet the requirements of environmental standards and safety certifications, such as the German TÜV, Green Seal GS-11, the EU Ecolabel, and the Blue Angel.

Dr. Matthias Beller addressed sustainable chemistry in his keynote speech.

In the range of rheology modifiers, BASF introduced DSX® 3801, a VOC-free, mid-shear rheology modifier with excellent ICI thickening. The ICI build of the thickener clearly exceeds that of benchmark waterborne products, even at lower dosages. Due to the high efficiency and improved performance of DSX® 3801, a smaller amount of it is needed in formulations—a "do more with less" approach that delivers sustainability benefits.

Dow Coating Materials announced the launch of its new EVOQUE™ Pre-Composite Polymer Technology—a revolutionary development for paints and coatings that promises to change the way formulators think about hiding and the use of titanium dioxide (TiO_2). The acrylic-based technology improves the particle distribution and light scattering efficiency of TiO_2, facilitating improvements in hiding efficiency and allowing for up to 20 percent less TiO_2 used in the formulation. Additional benefits include improved barrier properties such as stain and corrosion resistance.

Depending on their formulation goals, paint manufacturers can choose to reduce TiO_2 content or improve hiding while they improve paint performance. The Pre-Composite Polymer Technology may also help formulators reduce the carbon footprint of their end products by reducing the energy footprint that comes from mining, processing, and transporting TiO_2 to their formulation plants. Dow Coating Materials is conducting a life cycle analysis, which will be verified by a third party, to quantify the full spectrum of sustainability advantages that may result from using its new technology.

Pigments

The trend for "green" products also extended into the new pigments offered from the various suppliers. The developments were predominately in color pigments, although some new environmentally friendly anti-corrosion pigments were on show from companies such as Halox, Nubiola, SNCZ, Sachtleben, and Pigmentan.

Smart Coatings

One class of "smart coatings" are the self-healing systems that incorporate Bayer MaterialScience products. The systems are functionalized anti-corrosion coatings or topcoats that can "heal" damage autonomously, similar to the self-healing mechanism of the human skin.

Other products for smart coatings were for graffiti resistance.

New perspectives for smart coatings are being found in marine coatings with the use of carbon nanotubes, again from Bayer MaterialScience. The nanotubes allow another approach to providing different properties and additional functions, and their use as coating additives could open up even more intriguing perspectives. The high mechanical strength and electrical conductivity of the particles, in par-

ticular, promise novel possibilities for formulating coatings and for improving the strength of structural components while keeping their weight extremely low. Novel epoxy-gel coatings with nanotubes are already significantly improving the scratch-resistance of coatings for ship hulls.

Nanotechnology is also being used to give floor coatings with improved properties. The COL.9® nano-based binder from BASF, which has been used to produce "self-cleaning" wall coatings, can also be used to coat substrates such as concrete, stone, or tiles. This means that, for example, tire marks or oil stains on garage floors can be a thing of the past. The functional principle is the same for both facade and floor applications. The binder combines the benefits of synthetic resin dispersions with those of silicates. (COL.9 is a dispersion of organic polymer particles in which nanoscale particles of silica are incorporated.)

The organic part of the binder, i.e., the acrylic resin, ensures sufficient elasticity while the mineral part lends the colored coating the required rigidity. This makes coatings particularly resilient as well as resistant to dirt and chemicals.

Congress

The themes at the show were also prominent at the parallel. In fact, the plenary lecture by Professor Matthias Beller, University of Rostock, Germany, was "Sustainable chemistry: A key technology for the 21st century," which addressed the improvement of industrial chemicals production.

Approximately 150 papers were presented in 25 sessions covering a range of technologies and end uses, with specific sessions on sustainability and bio-based coatings, smart coatings, and nano-technology. The majority of new products on show were also the subject of detailed technical presentations.

Summary

The emphasis of the products being exhibited and technologies presented was on their environmentally friendliness, with materials for waterborne systems predominating. Companies were also keen to explain their desire to use renewable ingredients as their raw material sources and their efforts in reducing the carbon footprint of their production facilities.

Brian Goldie, technical editor for *JPCL*, has worked with protective coatings for many years, including in the oil industry.

JPCL

Due Process: Understanding SSPC's QP Program Disciplinary Action Criteria

By Michael Damiano, SSPC, Director of Product Development and QP Program Administrator

SSPC launched the Painting Contractor Certification Program (PCCP) in 1989 to provide facility owners with a tool to evaluate the primary technical capabilities of coating contractors and, at the same time, limit inquiries to contractors that were qualified to the SSPC standard.

The program also provided the industrial painting contractor with a framework for continual improvement so that contractors could distinguish themselves from less qualified contractors and level the playing field when competing for coating contracts.

In the first years of the PCCP, SSPC evaluated contractors based on review and acceptance of an extensive submittal package and a subsequent on-site audit to verify that the contractor had the ability to perform according to its submittal package.

To become and remain certified, a contractor had to pass initial and annual audits and meet administrative requirements. An initial audit consisted of a visit to the contractor's headquarters and an active job site to assess capability. An annual audit consisted of a visit to one or more job sites to confirm that the contractor was maintaining its capability. After completion of a three-year term, the contractor would be required to undergo and pass another full audit, followed by two annual audits.

In 1992, the SSPC Board of Governors (BOG), under the leadership of Dale Atkinson, established the PCCP Advisory Committee. The mission of this standing committee was to make recommendations to the SSPC staff and the BOG on administration of the PCCP.

During the mid-1990s, the SSPC PCCP Advisory Committee, led by John Conomos (John B. Conomos Inc.) and Ralph Trallo (Cannon Sline), took the position that SSPC needed to take a critical look at the PCCP as it approached 10 years of service to the protective coatings industry.

This led to SSPC commissioning Fails Management Institute (FMI), a construction industry consulting firm, to do a comprehensive study of the PCCP, also referred to as the SSPC Certification Quality Program for Industrial Coating Contractors, or the Contractor QP Program.

The FMI study concluded, among other things, that in order for the PCCP or QP program to grow in both the public and private sectors, SSPC would need to add more "teeth" to the PCCP by creating a special code of conduct that would supplement the existing audit program. This code of conduct (outside of the audit arena) would allow SSPC to discipline certified contractors who deviated from this code.

Thus, the Disciplinary Action Criteria, more affectionately known as the "DAC," was born in January 1998.

The DAC's primary author, John Conomos, realized that while most industrial coating contractors supported the basic mission of the PCCP, there would always be a handful of contractors that would be motivated to get certified solely to get on the bidders list. These contractors had no intention of adhering to program requirements once the auditor departed.

As a result, Conomos drafted a code of conduct that SSPC Certified Contractors would have to follow or run the risk of being suspended or having SSPC revoke their certification if they violated the requirements of the DAC.

The DAC establishes a set of violations, or "Critical Faults," that, if violated, could result in disciplinary action in the form of a "Warning"; being placed on "Probation"; being "Suspended"; or "Revocation" of SSPC Certification.

Critical Faults were established for safety, environmental, and ethical violations of the DAC. Violations, or Critical Faults, result in increasing discipline depending on the severity of the violation. For example, a contractor convicted of a felony in relation to its coating operations could face a revocation of its SSPC Certification for two years. On the other hand, a contractor who is found to have committed a paperwork-related environmental violation could be placed on probation for 5 months.

The DAC continues to be a fluid, evolving document. Since being

Continued

released in 1998, the DAC has undergone several reviews and revisions based on lessons learned and new issues that have arisen.

One of the more notable changes to the DAC in recent years was the addition of a special provision, which defines disciplinary actions to be taken against certified contractors who suffer work-related fatalities. Unfortunately, this provision was developed because a very small percentage of certified contractors had suffered fatalities, and the DAC at that point didn't contain explicit provisions to deal with fatalities.

Under this special provision, contractors who suffer fatalities must now report them to SSPC within 5 days and keep SSPC informed of any investigations and citations issued as a result. Contractors who suffer repeat fatalities as a result of poor safety practices face suspension and revocation of their certification.

Because of the seriousness of a fatality, contractors often contest citations issued in relation to a fatality. It often takes years for a contractor to go through the appeal process established by agencies such as OSHA before rendering a final decision. It is only after a final decision is made, with regard to allegations of safety violations, that SSPC can take disciplinary action.

Maintenance of the DAC is the responsibility of the SSPC staff working in conjunction with the PCCP Advisory Committee. The PCCP Advisory Committee reviews all changes to the DAC before being submitted to the SSPC BOG for approval.

The Process

The process for taking disciplinary action is fairly straightforward. When an allegation that a certified contractor has violated the DAC is brought to SSPC's attention, SSPC investigates the allegation to confirm that the event actually took place.

Once SSPC verifies that there are grounds for taking disciplinary action, SSPC notifies the contractor in writing. The notification states the nature of the DAC violation and the disciplinary action SSPC is issuing as a result.

Table 1 – SSPC Disciplinary Actions 2005–2010

FY	Revoke	Suspend	Watch List	Total
2005	0	17	4	**21**
2006	4	5	5	**14**
2007	0	11	11	**22**
2008	1	13	7	**21**
2009	2	9	10	**21**
2010	4	10	9	**23**
Average	**2**	**11**	**8**	**20**
Total	**11**	**65**	**46**	**122**

The contractor then has 10 working days to appeal. If the contractor appeals, the pending disciplinary action is placed on hold until the appeal process is completed.

The contractor must first submit a written appeal. If SSPC rejects the written appeal, the contractor has the option to continue the process by requesting an informal meeting with SSPC at the SSPC Headquarters in Pittsburgh, PA. If the matter cannot be settled at the informal meeting, the contractor can request formal arbitration.

The arbitration panel may deny the appeal or modify the penalty, as it deems appropriate. SSPC and the contractor are bound by the arbitration panel's decision.

Watch List

Sometimes an event takes place that results in an allegation. For example, a contractor may be issued willful, serious, or repeat OSHA citations in relation to a job site incident. However, if the contractor contests the citations, SSPC holds off issuing disciplinary action by placing the contractor on a "Watch List" until the contractor completes due process.

In some cases, the contractor may be exonerated of any wrong doing as a result of the governmental agency's due process or a court decision. In such cases, SSPC does not issue disciplinary action. But if the allegation is affirmed after completing the due process, SSPC issues the appropriate disciplinary action.

Actions Taken

During the five-year period from 2005–2010, SSPC took a total of 122 disciplinary actions.

These included: 11 revocations, 65 suspensions, and placement of 46 contractors on the Watch List. Two disciplinary actions remain on appeal, pending completion of due process through the OSHA Review Commission.

Summary

The DAC continues to evolve. In fact, it is currently undergoing a comprehensive review by a PCCP Advisory Committee Task Group with the intent to make it even stronger. SSPC is aware that a few contractors are motivated to seek certification solely to get their names on the bidders list. The idea of improving their businesses and the industry as a whole is, unfortunately, not their primary consideration for seeking certification. They do not intend to comply with certification standards once the SSPC auditor has left the job site. It is for this reason that the DAC remains an important tool for SSPC to police its ranks to ensure that certified contractors live up to the highest industry standards for quality workmanship, safety, environmental protection, and ethical practice.

SSPC Renewed as Authorized Training Provider for FBPE

SSPC announced that the Florida Board of Professional Engineers (FBPE) has renewed its authorization of SSPC as a continuing education provider. This means that FBPE will continue to award continuing education units (CEUs) to professional engineers in Florida who pass "area of practice" courses offered by SSPC.

Courses include: Fundamentals of Protective Coatings (C1), Planning and Specifying Industrial Coatings Projects (C2), Lead Paint Removal (C3), Lead Paint Removal Refresher (C5), and the Bridge Coating Inspector Program (BCI).

FBPE was established by the Florida Legislature to regulate the practice of engineering in the state. FBPE is responsible for reviewing applications, administering examinations, licensing qualified applicants, and regulating the practice of engineering throughout the state.

For more information regarding SSPC training and certification programs, contact Jennifer Merck, SSPC Training and Technical Program Specialist, at 877-281-7772, ext. 2221, or merck@sspc.org.

SSPC's Coatings Workshop at IBC Provided a Wide Range of Education

Pradeep Kodumuri, SES Group

Aimée Beggs, SSPC

Clint Ramberg, Spider—A Division of Safeworks LLC

The 28th Annual International Bridge Conference (IBC) took place from June 5–8, 2011 at the David L. Lawrence Convention Center in Pittsburgh, PA. SSPC served as the official sponsor of the Coatings Workshop on June 7.

The session consisted of seven speakers (shown here) from across the U.S. They presented on a range of topics such as bridge access, standard usage, improving shop and field painting throughput by reducing finish coat handling time, performance evaluation of one-coat systems on new steel bridges, Pearl Harbor Bridge climate control, and slip coefficient test of coatings for slip-critical bolted connections.

Each presenter educated the attendees on current and recent projects within the coatings industry and had a brief question and answer period at the end of each presentation. The workshop was informative and educational and provided coating industry professionals with new viewpoints of how to handle planning and fieldwork on jobsite locations.

William Corbett, PCS, KTA-Tator, Inc.

Heather Stiner, SSPC

Dave Simkins, Polygon

Kurt Best, Bayer MaterialScience LLC

Continued

SSPC South Carolina Chapter Held May Meeting

On Tuesday, May 31, 2011, 22 people attended the SSPC South Carolina Chapter Spring 2011 meeting at the Radisson Hotel in Columbia, SC.

The meeting featured three guest speakers. Robert Richter of Chlor*rid International Inc. and Warren Neuberger of Louisville Solutions, Inc. spoke about contaminants of various substrates and work environments. Joe Compton of EHS Risk Solutions spoke on environmental health and safety in the work place and risk management.

The South Carolina chapter is planning to hold a future meeting and invites SSPC members in North Carolina to join in. For information about future meeting topics or education programs, contact the South Carolina chapter chairman, John Carson, of The Sherwin-Williams Company at 843-475-9539. Additional information on the chapter is also available at www.sspc.org/membership-chapters-southcarolina.

SSPC Presents In-Depth Look at Standards at IBC

Heather Stiner, SSPC Protective Coatings Professional, and Aimée Beggs, SSPC Standards Development Specialist, presented "An In-Depth Look at Standards Most Frequently Used by Industrial Painters" during SSPC's Coatings Workshop at IBC.

The presentation answered frequently asked questions for standards SSPC-SP 1, Solvent Cleaning; SSPC-SP 2, Hand Tool Cleaning; SSPC-SP 3, Power Tool Cleaning, including proposed revisions to the definition of "dull putty knife"; SSPC-SP 11, Power Tool Cleaning to Bare Metal; SSPC-SP 13, Surface Preparation of Concrete; and SSPC-SP 15, Commercial Grade Power Tool Cleaning. Visual references SSPC-VIS 1, SSPC-VIS 3, SSPC-VIS 4, and SSPC-VIS 5 were also discussed.

The presenters also covered SSPC/NACE joint standards for surface preparation, which includes SSPC-SP 7/NACE No. 4, Brush-Off; SSPC-SP 14/NACE No. 8, Industrial (1999); SSPC-SP 6/NACE No. 3, Commercial; SSPC-SP 10/NACE No. 2, Near-White; SSPC-SP 5/NACE No. 1, White Metal; and SSPC-SP 12/NACE No. 5, Surface Preparation of Metals by Waterjetting Prior to Coating.

Other SSPC standards and guides that were covered included

- SSPC-PA 1, Shop, Field, and Maintenance Painting of Steel;
- SSPC-PA 7, Applying Thin Film Coatings to Concrete;
- SSPC-PA 2, Measurement of Dry Coating Thickness with Magnetic Gages, including non-mandatory appendices, definitions, and upcoming changes;
- SSPC-PA 9, Measurement of Dry Coating Thickness on Cementitious Substrates Using Ultrasonic Gages; and
- SSPC-Guide 12, Guide for Illumination of Industrial Painting Projects.

Issues relevant to many of the standards were discussed, such as abrasive type and size, dust removal, testing for soundness, flash rusting, measuring DFT on large structures, verification of gage readings, and coating thickness restriction levels.

Stiner and Beggs said that an SSPC Profile Standard will be coming soon. It will cover when, where, and how many readings to take based on the specified profile measurement method. It is awaiting final approval by SSPC's Standards Review Committee and the Board of Governors.

For more information, or to order SSPC standards and guide documents, visit www.sspc.org.

Training Updates

SSPC held its Protective Coating Inspector (PCI) course in Singapore on May 16–27, 2011. Fourteen students participated, and Muniandi Dewadas and Bani Quim led the course.

Students of SSPC's PCI Course in Singapore

The NAVSEA Basic Paint Inspector (NBPI) program took place on May 23–27, 2011. The U.S. Navy in San Diego hosted the program, and 13 students participated. The instructors were Phil Parson and Dennis Brown.

The U.S. Navy in San Diego hosted the NBPI program.

LT Christopher R. Hays, ARCO (ARDM 5) 1st LT, said, "Thanks for the class. With this certification and knowledge, we are able to continue to meet the stringent requirement of submarine critical hull preservation and support the global war on terrorism."

Visit www.sspc.org for training and certification programs scheduled throughout the year.

agencies & associations

OSHA Unveils Interactive Web Site to Explain Recordkeeping Rules

The Occupational Safety and Health Administration (OSHA) recently launched a new interactive web tool, the OSHA Recordkeeping Advisor, to help users determine whether injuries and illnesses are work-related and recordable under the OSHA recordkeeping rules.

The OSHA Recordkeeping Advisor is an interactive tool that simulates an employer's interaction with a recordkeeping rules expert.

The tool adapts to users' responses to questions to help determine whether

- the injury or illness is work-related,
- an event or exposure at home or on travel is work-related,
- an exception applies to the injury or illness,
- a work-related illness or injury needs to be recorded, and
- any provisions of the regulations apply when recording a work-related injury or illness.

The new web tool can be found at www.dol.gov/elaws/osharecordkeeping.htm.

ASTM Plans Committee Meeting for November

ASTM International Committee B08 on Metallic and Inorganic Coatings plans to meet on Nov. 17, 2011, at the Tampa Marriott Waterside in Tampa, FL.

ASTM meetings are open to all interested individuals. For more information, visit the committee web site at www.astm.org/commit/b08.htm or contact Kate McClung at 610-832-9717 or kmcclung@astm.org.

AkzoNobel Announces New CEO

AkzoNobel N.V. announced that CEO Hans Wijers will step down next year and will be replaced by Ton Büchner, the current president and CEO of Sulzer AG.

The change, pending board approvals, will take effect at the company's Annual General Meeting in 2012.

Büchner started his career as an offshore oil and gas construction engineer. He graduated from Delft University of Technology with an MSc in civil engineering; earned an MBA from the International Institute for Management Development in Lausanne, Switzerland; and attended the Stanford Executive Program in the U.S.

For more on this story, visit www.paintsquare.com.

Ton Büchner

companies

Senior Management & Personnel Changes at Bayer

Bayer MaterialScience (Leverkusen, Germany) has appointed Peter Vanacker to the executive committee position of head of industrial marketing and innovation.

Peter Vanacker

Effective July 1, Vanacker will be responsible for driving industrial marketing and innovation as key elements of Bayer's growth strategy. He will lead the company's development business activities in Functional Films and Carbon Nanotubes, among others.

Dr. Joachim Wolff succeeds Vanacker as head of the Polyurethanes Business Unit. Daniel Meyer joined the executive committee and succeeds Wolff as head

of the Coatings, Adhesives, and Specialties Business Unit.


Dr. Joachim Wolff

Bayer MaterialScience has extended its executive committee to incorporate key functional activities. Michael Bernhardt, Wolfgang Miebach, and Richard Northcote joined the executive committee on July 1 in their positions as heads of Human Resources, Corporate Development, and Communications and Public Affairs, respectively.

Steven Sternberger has been appointed as the industrial marketing manager for coatings in the Coatings, Adhesives, and Specialties (CAS) business unit. He leads the CAS team's efforts to meet evolving coatings requirements for industrial, construction, automotive, corrosion protection, and specialty customers.


Steven Sternberger

Sternberger has 30 years of marketing and sales experience in many segments of the coatings industry. He graduated from the University of Pittsburgh's Katz School of Business with a master's degree in business administration. In 2010, he was named the Business to Business Marketer of the Year by the Pittsburgh chapter of the Business Marketing Association.

Elcometer Opens Southeast Office

Elcometer (Rochester Hills, MI) announced the opening of a new office located in Charleston, SC, to serve as a hub for the Southeastern U.S.

The office will be headed by Kim Thompson, who brings several years of experience in the areas of computer-based software solutions, industrial equipment, painting, abrasives, safety, and spray booths.

PPG Launches Headquarters and Resin Plant in China

PPG Industries (Pittsburgh, PA) has announced the creation of PPG Management (Shanghai) Co. Ltd. The new Shanghai-based company opened June 1 and serves as business headquarters for PPG in China.

According to the company, PPG operates 14 manufacturing plants and two research and development centers throughout China.

PPG also launched its first resin production plant in China on June 16 at Zhangjiagang Yangtze International Chemical Industrial Park, Jiangsu Province. The plant will supply advanced resin products to PPG coatings plants and other customers in the region.

The new plant will produce finished electrodeposition resins for use in the manufacture of automotive and industrial electrocoat products.

Read what Charles E. Bunch, PPG Chairman and CEO, and Viktor Sekmakas, president of PPG Asia/Pacific, said about the company's growth in China at www.paintsquare.com.

Polyguard Names Rep for Latin America

Polyguard (Ennis, TX) promoted Ariela Guardado to Latin America business development representative.


Ariela Guardado

Guardado holds a public relations and business degree from Texas Tech University and is NACE CIP Level 1-certified. She will be based out of Texas and will assist in developing and supporting the Latin America and Caribbean markets.

Arkema Forms New Coatings Business Unit

Arkema (Cary, NC) has combined the assets of its existing Arkema Emulsion Systems with those just acquired from Total Specialty Chemicals to form Arkema Coating Resins. The new business is based in Cary, NC.

The new business offers chemistries for industrial finishes, powder coatings, architectural paints, construction products, traffic paints, sealants, and adhesives. Product lines include water- and solvent-based alkyds, polyester resins, powder coating resins, high solid acrylic polyols, additives, and a wide range of waterborne emulsions.

Arkema finalized the acquisition of coatings assets from Total Specialty Chemicals on July 1. The €550 million deal includes the coatings resins (paints, adhesives, etc.) of Cray Valley (Europe, Asia, South Africa) and Cook Compoite Polymers (U.S.), as well as the photocure resins of Sartomer (Europe, U.S., Asia).

To read more about the new business, including a message from Richard Jenkins, the newly appointed global group president for Arkema Coating Resins, visit www.paintsquare.com.

International Paint Enters New Distribution Agreements

International Paint LLC, an AkzoNobel company, has entered two strategic distribution agreements that will supply the company's Marine and Protective Coatings products in the Caribbean and Central America.

The first agreement is with Penta Paints, a subsidiary of the Ansa McAl Group. Under the new agreement, Penta

Continued

Paints will supply International Paint's marine and high-performance protective coatings and linings to growing clientele in the Caribbean.

The second agreement appoints HB Fuller as the distributor of International Paint's marine and protective coatings to customers in Costa Rica, Guatemala, Honduras, Nicaragua, El Salvador, and Panama.

Huntsman Names Asia Pacific CEO

Huntsman has named Anthony P. Hankins to the new role of CEO, Asia Pacific, based in new regional headquarters in Hong Kong.


Anthony P. Hankins

Hankins will continue as president of the company's polyurethanes division, which will relocate its global headquarters from The Woodlands, TX, to Hong Kong during 2011.

Hankins will facilitate the corporate and cross-divisional activities required to deliver growth. He has extensive international experience, having held senior management positions in Europe, Asia, and the U.S.

BYK-Chemie Names Managing Director

BYK-Chemie GmbH has announced the appointment of Albert von Hebel to succeed the retiring Gerd Büscher as managing director.


Albert von Hebel

Von Hebel is responsible for finance, controlling, purchasing, IT, integrated management systems, and general administration. He has been with BYK-Chemie since 1996.

Dow Performance Materials Names Director

Dow Performance Materials has named Carlos Silva Lopes as strategic marketing director for the business, which includes Angus Chemical Co. and Acima Specialty Chemicals. Silva Lopes will be responsible for leading all global marketing activities for a number of markets.


Carlos Silva Lopes

Angus provides a range of specialty chemicals that serve as pigment dispersants for clay, titanium dioxide, and calcium carbonate pigment. Acima manufactures a range of tin catalysts to producers of polymers including polyurethanes, polysilicones, polyesters, and polyolefins.

Hempel Expands in India

Danish coatings maker Hempel is expanding its operations in the Indian subcontinent with the opening of a new manufacturing unit in Nashik, Maharashtra.

The new plant will feature the latest in environmentally friendly coating production equipment, including a semi-automatic powder handling system, an automatic liquid dosing system, and a solvent recovery unit, the company said.

The one-building factory is spread across a 1,500 square meter plot and is designed to house raw materials and the finished product. Hempel expects the factory to produce 1.5 million liters annually under one-shift operation. If necessary, the factory can eventually operate with two shifts to raise production capacity to 2.4 million liters.

Read more about Hempel's "One Hempel—One Ambition" business strategy, including its latest acquisitions and planned expansions, at www.paintsquare.com.

Jet Edge Chooses Distributor in Poland

Jet Edge, Inc., a manufacturer of ultra-high pressure waterjets, announced that TECHJET, located in Malbork, Poland, is now distributing Jet Edge waterjet pumps.

TECHJET carries Jet Edge's full line of ultra-high pressure waterjet pumps, as

well as offering precision waterjet cutting tables, waterjet parts, and service.

AkzoNobel Plans New Facilities for Chemicals, Coatings

AkzoNobel announced a partnership with Guangxi CAVA Titanium Industry Co. Ltd. to produce and supply titanium dioxide. The collaboration includes the construction of a new TiO2 plant in Qinzhou, China. Financial details were not disclosed.

Guangxi CAVA Titanium Industry Co. Ltd. was recently established to produce titanium dioxide. The company is currently building a 100,000-ton TiO2 plant at an industrial site in Qinzhou. Production is expected to start in early 2014.

The company also recently opened a new research laboratory in Deventer, the Netherlands, which houses more than 200 researchers from the company's RD&I organization. The facility is one of a network of six global RD&I centers that work with the company's businesses to undertake new research.

The new laboratory has already originated ideas for a biodegradable chelating agent used for cleaning detergents; a flame-retardant; and chemical intermediates used in the production of adhesives, pharmaceuticals, and cosmetics.

In June, AkzoNobel opened a €7 million fire protection laboratory at its Felling, UK, site. This is part of a €10 million investment in RD&I.

The lab will be operated by the company's Marine and Protective Coatings business, which supplies fire protection coatings used to protect steel structures.

AkzoNobel recently announced its plans to build a hi-tech manufacturing facility in the north-east of England. The company has around €110 million earmarked for the custom-built Decorative Paints site, which is anticipated to be operational by the end of 2014. The plans include a proposal to close the company's Prudhoe site and its manufacturing operations in Slough within three-and-a-half years.

products

PPG Debuts Tank Lining for U.S. Market

PPG Industries' Protective and Marine Coatings Business introduced veteran tank lining Phenguard for petrochemical and biofuel storage tank lining applications in the U.S.

The solvent-based coatings provide a lining system for tanks storing a range of chemicals and refined products.

The system includes:

• Phenguard 930, an off-white, two-component, high-build, amine adduct-cured phenolic epoxy primer;

Continued

• Phenguard 935, a pink, two-component, high-build, amine adduct-cured-phenolic epoxy middle coating; and
• Phenguard 940, a light gray, two-component, high-build, amine adduct-cured phenolic epoxy finish.

To read more about the coatings and to see a video of PPG's Dr. Robyn McMillan discuss other products, visit www.paintsquare.com. More information can also be found at www.ppgpmc.com/northamerica.

Blastrac Adds Authorized Outlet

Blastrac announced that Fishman Flooring Solutions is the newest authorized outlet for the company's shot-blasters, grinders, and dust collectors.

Fishman is based in Baltimore, MD, with 25 locations throughout MD, VA, NC, SC, TN, OH, and PA. The company's online catalog can be found at www.lfishman.com.

Aremco Introduces Hi-Temp Coating

Aremco Products Inc. has introduced Corr-Paint CP2070, a high-temperature, epoxy-novolac corrosion-protection coating designed for metal components and structures used in aircraft, automotive, chemical processing, foundry, and power generation equipment.

The coating is a two-part, gray-pigmented, 100%-solids, epoxy-novolac system designed for applications up to 300 F. According to the company, it adheres well to metal surfaces and provides corrosion resistance to a wide range of chemicals. It is also designed to provide good thermal shock, salt spray, and UV resistance.

Visit www.paintsquare.com and www.aremco.com for more information.

Magnalight Increases Line with Two New Products

Larson Electronics' Magnalight.com now offers the LM-30 telescoping light boom and the HAL-WCDE-4X1000, a stand-alone light tower package with a water-cooled diesel engine and 10,000-watt generator.

The LM-30 is capable of elevating commercial light fixtures, cameras, and similar gear up to 30 feet in height. According to the company, the light boom is constructed for durability and strength and can safely elevate 150 pounds of equipment. The product is made from steel and has a 13-foot-long upper section and a 17-foot-long lower section. The telescoping tower can be collapsed for transport and raised for deployment via two included 1,000-pound manual winches.

The HAL-WCDE-4X1000 is a 30-foot-tall light tower package that can

Low-Cost Cargo Hold Coating Developed

International Paint has introduced Intergard 7020 cargo hold coating for operators who don't need or cannot justify investment in the highest-performing products.

The product is formulated to provide good abrasion resistance and long-term corrosion protection and is appropriate for all bulk carrier types, according to the company. The pure epoxy coating is available in red and gray, contains aluminum, is low-VOC, and can be applied to surfaces prepared to a minimum of Sa2.

The company says that the coating can be applied at temperatures between -5 C and 35 C; has a smooth, glossy, easy-clean surface; is grain certified; and can carry even the harshest cargoes after 10 days' cure time.

More information is available at www.paintsquare.com or www.international-marine.com/cargoholds.

light areas up to seven acres. The tower includes four Class 1, Division 2, 1,000-watt metal halide lights mounted on top of a telescoping boom that can extend 30 feet in height and rotate 360 degrees, the company said. The unit is appropriate for industrial operations, oilfields, emergency services, large-scale event illumination, construction, and mining. The trailer-mounted system produces a total of 440,000 lumens of light.

The water-cooled diesel engine has a 15-gallon fuel capacity, allowing uninterrupted operation for 12 hours without refueling, according to the company. It also features key-operated starting, automatic low-oil-pressure and high-temperature safety shutoffs, and dual fuel filters.

For more information, visit www.paintsquare.com and www.magnalight.com.

Coating Said to Handle Severe Impact and Abrasion

ITW Devcon (Danvers, MA) recently announced DFense Blok™, an alumina ceramic bead-filled epoxy compound that, when used with DFense Blok™ Surface Wetting Agent, is said to increase drop impact strength.

The product can be used for repairing, rebuilding, and protecting typical wear and abrasion applications and can be used in place of abrasion-resistant metal and ceramic tile, the company said.

According to the company, the product achieves a functional cure in 4–5 hours, has good wear and abrasion resistance, withstands high-impact conditions, and withstands service temperatures up to 300 F.

For more information, visit www.devcon.com.

New Epoxy Made to Protect Food Shipments

The Sherwin-Williams Company (Cleveland, OH) has unveiled Carflex HS Epoxy, designed as a tough, flexible coating to prevent contamination when transporting and storing dry bulk food products.

The polyamide-cured modified epoxy is formulated for lining rail hopper cars, storage tanks, marine vessels, grain elevators, bolted/riveted tanks, and concrete. According to the company, the product meets FDA 175.300 for direct contact dry bulk storage.

The epoxy can be used as a one- or two-coat system; is impact- and abrasion-resistant; and is designed to provide corrosion protection, flexibility, and protection from cracks at flexing weld seams, the company says. It is 100% solids, contains zero solvents, had a VOC content of less than 100 grams per liter, and is free of bisphenol A (BPA).

Read the full story at www.paintsquare.com, or get more information at www.sherwin-williams.com.

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Intech Wins $22.7M Mathews Bridge Project

The Florida Department of Transportation awarded a contract of $22,689,657.10 to Intech Contracting, LLC (Lexington, KY) to perform structural repairs and coatings application on the Mathews Bridge, a 7,736-foot-long through truss bridge over the St. Johns River in Jacksonville. The contract, which required SSPC-QP 2 certification, includes lead-based paint abatement, coatings application, installation of impressed current and integral pile jacketing cathodic protection systems, neoprene pad replacement on bents and piers, expansion joint rehabilitation, and new steel erection.

Local Connections Lead to Awards

Fuel tanks at the Oroville Airport, courtesy of the owner

The city of Oroville, CA, awarded a contract of $5,760 to Darryl's Painting (Oroville, CA) to recoat two airport fuel tanks. The project includes pressure-washing, spot-cleaning, spot-priming, and coating the exterior surfaces of the 12,000 tanks, 37 bollards, and 160 feet of piping with an acrylic epoxy system.

Copia Specialty Contractors, Inc. (Brewer, ME) won two separate coating contracts by the city of Bangor, ME. The local firm signed a $44,400 agreement to resurface the floor and walls of a 180-foot by 21-foot by 11.5-foot-deep concrete primary tank. The concrete will be abrasive blast-cleaned (SSPC-SP 13) to remove spalling, patched, and coated with a ceramic fiber-reinforced system. The contractor also secured a $38,300 contract to apply an elastomeric acrylic system to the exterior surfaces and various appurtenances on two 600,000-gallon-capacity fuel tanks.

Era Valdivia Wins Tank Job

Era Valdivia Contractors, Inc. (Chicago, IL), SSPC-QP 1- and QP 2-certified, was awarded a $1,448,000 contract by the village of Skokie, IL, to recoat the interior and exterior surfaces of two 4.9 MG tanks, including a 155-foot-diameter by 31.5-foot-high ground storage tank and a 102-foot-diameter by 80 foot-high standpipe. The interiors will be abrasive blast-cleaned to a Near-White finish (SSPC-SP 10) and lined with an epoxy system, and the exterior steel will be blast-cleaned to a Commercial finish (SSPC-SP 6) and coated with a zinc-polyurethane-fluoropolymer system. The project also includes blast-cleaning (SSPC-SP 13) and coating the concrete foundations, as well as erecting containment structures.

HCI Industrial Wins Dam Painting Project

HCI Industrial (Vancouver, WA), SSPC-QP 1-certified, was awarded a contract of $269,922.86 by Chelan County Public Utility District No. 1 (Chelan,

Continued

WA) to coat spillway gates and surge tank surfaces at the Lake Chelan Project. The 490-foot-long, 40-foot-high concrete gravity dam delivers water to the associated powerhouse via a 2.2-mile-long penstock, with hydraulic pressure regulation provided by the surge tank. The contract includes handling low levels of lead and other metals on the gates and higher concentrations on the tank, which will be neutralized with an abrasive additive. The gate, trunnion, support beam, arm, tank, and diagonal tie rod surfaces will be blasted to a Near-White finish (SSPC-SP 10) and coated with a 3-coat, micaceous iron oxide-filled, moisture-cured urethane system.

Amstar Awarded Tank Rehabilitation

Amstar of Western New York, Inc. (Cheektowaga, NY), SSPC-QP 1- and QP 2-certified, won a contract of $1,620,000 to recoat a 1 MG elevated water tank for the city of Harwich, MA. The project includes relining the interior surfaces, which were last coated in 1996, and coating the exterior surfaces, which were painted in 2003. The exterior steel will be abrasive blast-cleaned to a Commercial finish (SSPC-SP 6) and coated with a zinc-epoxy-polyurethane

Treatment Facility Coating Contracts

Fine Painting & Allied Services, LLC (Portland, OR) secured a contract of $106,468.80 with the city of Vancouver, WA, to repair and line concrete surfaces in a 90-foot-diameter primary clarifier tank at the Westside Reclamation Facility. The concrete will be abrasive blast-cleaned (SSPC-SP 13), treated with sealant, repaired with epoxy mortar, and lined with elastomeric polyurethane.

Cor-Ray Painting Company (Santé Fe Springs, CA) was awarded a contract of $139,000 by the city of San Luis Obispo to perform maintenance painting on various concrete and metal surfaces associated with a primary clarifier, scum box, equalization tank, filter building, headworks, and cooling tower structures at a water reclamation facility. The project includes handling trace amounts of lead paint prior to applying epoxy-urethane and coal-tar epoxy systems.

system. The interior steel will be abrasive blast-cleaned to a Near-White condition (SSPC-SP 10) and lined with an epoxy system. The existing coatings contain lead, necessitating the use of a Class 1A containment structure (SSPC-Guide 6).

West Virginia DOT Lets Bridge Painting Project

The West Virginia Department of Transportation awarded a $1,240,000 contract to V.H.P. Enterprises, Inc. (Tarpon Springs, FL), SSPC-QP 1- and QP 2-certified, to recoat 1,448 tons of steel on dual bridges in Braxton County. The steel will be abrasive blast-cleaned to a Near-White condition (SSPC-SP 10) and refinished with a 3-coat, organic zinc-based system. The contract includes erecting Class 2A containment (SSPC-Guide 6) to capture the current lead-bearing system. The bid letting was heavily-contested, with a total of 15 contractors offering quotes.

Coast Guard Secures Waterjetting Services

The U.S. Coast Guard has awarded a contract to UHP Projects Inc. (Newport News, VA) to perform waterjetting services on various vessels at the USCG shipyard in Baltimore. The base bid involves performing water-blasting at 36,000-40,000 psi on a 210.5-foot-long, 34-foot-beam, 759-ton medium endurance cutter. The contract includes option items for work on five more vessels and a one-time, six-month extension for additional work. The award was a "best value decision," with weight given to technical capability, key personnel, quality control, past performance, and pricing. The contract, which required SSPC-QP 1 certification, is valued at $224,793.

North Carolina DOT Awards Bridge Repairs and Painting

The North Carolina Department of Transportation awarded a contract of $2,095,046 to Precon Marine, Inc. (Chesapeake, VA) to perform structural steel repairs and coatings application on three bridges over roadways and a bridge over the Tar River and a road. The project includes coating a total of 81,650 square feet of steel, which will be abrasive blast-cleaned to a Near-White finish (SSPC-SP 10), primed with inorganic zinc, and finished with two coats of acrylic. The contract, which required SSPC-QP 2 certification, includes controlling lead paint with Class 2A containment according to SSPC-Guide 6.