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

Cover: JPCL *Photo*

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A Time to Help and Something Else

On March 11th, a catastrophic event happened in Japan. The earthquake and tsunami that hit the northern part of the country was one of the worst natural disasters since scientists started recording those types of events. I am sure everyone has read or heard on news reports that the magnitude of the earthquake was a 9.0 on the Richter scale, and the subsequent tsunami sent a 124-foot wall of water six miles inland in some regions of Japan. The force of the water caused unspeakable damage along the entire northern coast and, as I am writing this editorial, the Japanese authorities are trying to deal with the massive radiation leaks at the Fukushima nuclear plant.

The Japanese people are in need of our support. The estimated cost of this disaster has been reported at 25 trillion yen, or $300 billion. In response to this disaster, the SSPC Board of Governors decided to support the victims of this tragedy by working with the SSPC Japan Chapter, located in Sasebo. The Board has decided to match funds given by the SSPC members, up to $5,000. If we reach that amount of donations from members, it would be a $10,000 total contribution. Who says it cannot be more if members give generously? The campaign is underway on our web site. You can go there and make a tax-deductible donation to this worthy cause.

In order to donate, follow these steps:

1) Go to the SSPC web site (www.sspc.org).
2) Click on the banner on the SSPC home page.
3) Scroll down to “Donate online via the SSPC Marketplace,” and click where it says “Click to Donate.”
4) When you click to donate, it takes you to a Marketplace item. Click on “Add to Cart.”
5) Fill in the amount you wish to donate on the first line. Fill in “1” under “Qty.”
6) Click “Add to Cart.”
7) Once you proceed to the checkout, you will be asked to fill in your e-mail address and password or create a new account.
8) Next, you will be asked for your billing address and payment information.
9) Complete the payment information and click “Proceed.”
10) You are finished when you click on “Place Order.” The next screen will provide you with an order confirmation number, which will also be sent to your registered e-mail address.

This may seem difficult, but it is not. I did it, and it took me less than two minutes. If you have any problems, please call or e-mail SSPC for assistance.

I realize that many of you may feel that since Japan, unlike Haiti, is a developed country, the Japanese do not need our assistance. I disagree. Those folks need our help, and we should make every effort to help them. So, if you can afford any amount, please consider giving it to SSPC on behalf of the SSPC Japan Chapter to help out those now suffering.

While I was writing this piece, and doing some research to ensure I had the correct facts, I was shocked by what some callous individuals wrote on a blog under a news report dealing with the subject. Someone wrote that the Japanese were deserving of such a tragedy because of their whaling practices and World War II. There were many comments worse than that, and I will not repeat them here.

I realize that there is freedom of speech and freedom of the press, but I am just an “average Joe” who thinks, “Why do people think they have the right to convey those types of feelings?” I am not the most “politically correct” person, but sometimes what is said or written goes beyond what a reasonable person would consider acceptable. I also have seen other blogs where folks have made statements that are totally false and have no merit. Why should someone have the right to make statements, knowing that there is not an ounce of truth to what they are saying? How do we stop this? By litigation? Litigation is a hassle and not easy. For anyone who has ever been involved in a lawsuit, it is just a pain in the neck, causing a person to spend thousands of dollars in defense when there is no real basis for even going to litigation.

The bottom line is that no one wins in the long run. There is quote often attributed to Mark Twain that states, “It is better to keep your mouth shut and appear stupid than to open it and remove all doubt.” I just wish that some folks would think before they write, because that quote fits the written word also.

Bill Shoup
Executive Director, SSPC

Kogler to Present SSPC/*JPCL* Webinar on Protecting Steel Edges

Bob Kogler

Prominent coating specialist Bob Kogler will present an SSPC/*JPCL* Education Series Webinar, entitled "Protecting Steel Edges," on Wednesday, June 8 from 11: 00 a.m. to noon, EST.

The webinar, to be presented at a basic level, will describe the advantages and disadvantages of specific methods of obtaining sufficient coating thickness on steel edges and other irregular steel surfaces, where coatings tend to pull away during curing, leaving thin or non-existent coverage.

Coating specifiers will be particularly interested in Kogler's description of how to effectively address protecting steel edges in the project specification.

Free registration for the webinar is available online at www.paintsquare.com/education.

Education Series Webinars provide continuing education for SSPC recertifications, as well as technology updates on important topics. While participation in the webinar is free, a test is available after the webinar for those who wish to receive continuing education credits from SSPC. Cost of the test service is $25. All participants receive a free certificate of completion.

Bob Kogler, a principal with Rampart LLC, was formerly the head of corrosion protection and coatings research at the Federal Highway Administration. He is also Past President of SSPC and a Contributing Editor to *JPCL*, where he has published many articles on the protection of concrete and steel highway bridges.

SSPC 2012 Invites Papers & Presenters

SSPC has announced a call for papers and presenters for SSPC 2012 featuring GreenCOAT, which will be held Jan. 30 to Feb. 2, 2012, in Tampa, FL, at the Tampa Convention Center. SSPC 2012 is the only conference and exhibition dedicated 100% to protective, marine, and industrial coatings.

Presentation topics of interest include advances in containment design; best application practices for high solids materials; cleaner abrasive technology; coating application methods; coating failures; coatings to support emerging green industries (wind power, nuclear coatings); coating inspection equipment; coating types and characteristics; concrete surfacing; corrosion control; durability of generic types of industrial liquid coatings containing less VOCs and HAPs; environmental health and safety; estimating; flooring; green application techniques (i.e., plural component technology); green coatings; green regulations; green surface prep (waterjetting, etc.); marine and military coatings; powder coatings; surface preparation; and women in the coatings industry.

An advisory committee of SSPC members will evaluate abstracts based on originality, quality of the abstract, relevance/significance to the industry, and objectives. Abstracts are due by June 13, 2011. Those accepted will be notified on July 15, 2011, at which point a formal written paper (5–10 page minimum) must be submitted.

Submit abstracts to Marsa Lowerison at lowerison@sspc.org. For complete information visit www.sspc.org/events. For information about exhibiting at the conference, contact Kate Jurik at jurik@sspc.org or 877-281-7772.

ASTM Presents Award of Merit

ASTM International Committee A01 on Steel, Stainless Steel, and Alloys has presented consultant Michael Gold of Gold Metallurgical Services LLC (North Benton, OH) with the ASTM Award of Merit.

Michael Gold

The Award of Merit and accompanying title of fellow is ASTM's highest recognition for individual contributions to standards activities. Gold was honored for his significant service to Committee A01 in the standardization of steel plates for boilers and pressure vessels, castings for special applications, and steel forgings for wrought fittings.

Gold has been a member of ASTM since 1979 and is active on several A01 subcommittees. He has also received the Award of Appreciation in 2001 and the Award of Excellence in 2007.

He earned a BS in physics and an ME in metallurgy from Yale University. Gold is a life fellow of ASME.

JADCO Loses Founder James Dagan

James Dagan, 48, founder and owner of JAD Equipment Co., died suddenly Feb. 20 at home from a pulmonary embolism.

Mr. Dagan spent 32 years working with spray equipment, beginning in high school when he started work for Youngstown Spray Equipment as a repair tech for spray and blasting equipment. In 2001, he founded JADCO with the help of his lifelong best friend, Joe Hunsbarger. He was a member of SSPC, and JADCO is a corporate member.

James Dagan

While JADCO originated in a 2,000-square-foot facility, it quickly expanded to an 8,000-square-foot facility, and was scheduled to move to a 21,000-square-foot space the day after Mr. Dagan passed away. The move was rescheduled for March 1.

Between his many official duties and his unofficial role as company "funster" (he was also an avid golfer, bowler, dart, and pool player), the founder's loss is keenly felt, Hunsbarger said.

"He was a jokester all the time," said Hunsbarger. "He would make everybody laugh. He was the funniest guy you ever knew."

Mr. Dagan is survived by his sister, Mary Moon; his companion, Becky Dee of Youngstown, OH; his brother, Jeffrey Lee Farrow; nephews and a niece.

2011 SSPC Board of Governors Election

The 2011 Board of Governors Election is being conducted to elect three people to the Board.

Voting is open to active members of SSPC only.

Members can vote for their preferred candidate in two easy ways:

- Use the electronic ballot link that was sent via email on May 6, 2011
- Use the Ballot PDF that is available in the Members Only section of the web site, www.sspc.org. Note: You will need your username and password to access the Ballot PDF. Please contact Terri McNeill (412-281-2331, ext. 2233, or mcneill@sspc.org) if you have forgotten your login information.

Candidate biographies are listed on the ballot. Members can either vote for one of the listed candidates or write in a candidate of their choice.

All ballots must be returned by fax, mail, or electronically by June 15, 2011. Ballots can be mailed to Ms. Karen Cheng, SSPC: The Society for Protective Coatings, 40 24th St., Sixth Floor, Pittsburgh, PA 15222-4656; faxed to 412-281-9992; or emailed to cheng@sspc.org.

SSPC, AISC Announce Joint Paint Shop Standard

SSPC: The Society for Protective Coatings and the American Institute of Steel Construction (AISC) are pleased to announce a joint certification standard for shop application of protective coatings.

The standard, "Certification Standard for Shop Application of Complex Protective Coating Systems," was the culmination of several years of work by a joint committee of coatings and steel industry professionals representing both organizations. The standard describes requirements for certification of firms that shop apply complex painting systems.

According to Michael Damiano, Director of Product Development at SSPC, "The strength of this standard is that it enables paint shops and steel fabricators to meet the qualification criteria of two major organizations at one time, while giving owners and specifiers a single governing document to reference."

Jacques Cattan, VP of Certification for AISC added, "The jointly sponsored certification will confirm to owners, the design community, and the construction industry that a firm has knowledgeable personnel and the organization, experience, procedures, and equipment to provide surface preparation and application of complex painting systems in a shop facility according to contract specifications."

The joint standard is available now for free download on AISC's web site at www.aisc.org/jointpaintstandard and SSPC's web site at www.sspc.org/marketplace for inclusion into project specifications and contract documents. Starting on June 1, 2011, participants will only be responsible for the criteria of the current standards but will be informed of changes or possible non-conformances that will take effect with the new joint standard during their next annually scheduled audit. Full implementation of the new joint standard will be complete in 2012.

The American Institute of Steel Construction (AISC), headquartered in Chicago, is a not-for-profit technical institute and trade association established in 1921 to serve the structural steel design community and construction industry. For more information, visit www.aisc.org.

SSPC, headquartered in Pittsburgh, PA, is internationally recognized as the leading society in the field of protective coatings. For more information, visit www.sspc.org.

On Measuring WFT to Predict DFT

Our shop applies a great deal of organic zinc-rich primer, and we have found that WFT readings with a standard gauge are not accurate predictors of DFT.

How do you measure wet film thickness (WFT) on shop-applied OZ primers to accurately predict dry film thickness (DFT)?

James Prevatt

Asset Preservation Partners

Zinc-rich coatings, both organic and inorganic, have larger particle sizes and will not shrink like conventional coatings. The amount of shrinkage will vary with the change of particle size of zinc. Apply a gallon to the prescribed sq. ft. area (e.g., 200 sq. ft. per gallon), carefully noting the WFT. Once dry, measure the DFT, and you can estimate the true shrink of the coating from solvent evaporation. It should be around 60-80% of a normal shrinkage. It is best to know in a shop situation to be sure on your estimate of usage.

Tom Swan

M-TEST

The best way to measure the thickness of a zinc-rich coating before it dries completely is to put a shim of known thickness on the zinc coating, and use a DFT gauge to measure the thickness of the coating. Then, subtract the thickness of the shim, and you should have a pretty good estimate of the thickness of the coating. It's not perfect, but it's probably the best you will do. I haven't tried it with organic zinc coatings, but it works reasonably well with inorganic zincs.

Lee Edelman

CW Technical Service

Organic zinc-rich primers are designed for ferrous metals and are formulated to dry fast. The spread rate is based upon volume of solids. Most organic zinc-rich primers have product data sheets that recommend WFT be checked, but the accuracy of WFT testing of these materials is questionable. Care should be taken not to apply heavy film build during the application process. Take several WFT measurements to get an overall average. Organic zinc-rich primers are porous.

Richard D. Souza

Stoncor Middle East LLC

Shop-applied organic zinc primers dry too quickly to take meaningful WFT measurements; therefore, it is always advisable to prepare different sample plates with a varying number of passes and to take DFT readings on the plates once the coating is fully cured or on overnight curing. This way, the operator knows how many passes he should spray to achieve the desired DFT. The thinning percentage and tip size should remain the same, and best practice is to carry out such test panels with different sprayers and spray stations to keep variable to a minimum.

Guru Sankar

Sathya Hitec Solutions

By using the conventional WFT gauge, we can arrive at two calibration graphs. In the first one, we can maintain the same blast profile, and by varying the coverage of the organic zinc rich coating, we can get the first graph. In the second one, we can maintain that the coverage is the same, and by varying the blast profile, we can get a second graph. Through experience in correlating these two graphs, we can predict the DFT from the WFT measurements.

Larry Muzia

Exceletech LLC

The difficulty in obtaining accurate wet film readings with zinc-filled coatings is that the metallic zinc particles can pack under the outer edges of the gage and create a false bottom, so to speak. Remember, we have a metal-filled product, which will not always move out from under the wet film gage edges, thereby not allowing the gage to properly seat on the steel member. Rapid drying is another issue to consider, especially with inorganic zincs. Taking several immediate wet film readings and the application by a professional applicator can help achieve a responsible procedure to achieve the necessary results. Although organic zincs are more tolerant of excessive DFT than iozincs, more is not always better. Also, remember to account for magnetic base plane when verifying the DFT gage.

John Fletcher

Elcometer Limited

The measurement of wet film is a very simple process that is described in ASTM D4414 Method A and ISO 2808-1A.

The principle of the measurement is that a series of notches are cut into the side or edge of the comb to form a series of teeth that have known distances from the reference shoulders formed at either end of the notches. The notches are pushed into the freshly applied, and still wet, coating until the shoulders are against the substrate. The WFT will be between the thickness value of the high-

Continued

est tooth coated with the film and the lowest tooth that is left uncoated.

The DFT is calculated from the wet to dry ratio for the paint, which is normally quoted in the paint manufacturer's data sheet, as a percentage solids value.

DFT = WFT x Percentage solids for the coating

For example, if the coating has a wet to dry ratio of 2:1, this means that the volume solids will be 50%, and for a WFT of 120 μm the DFT will be 50% or 60 μm.

There are three reasons why the wet film comb does not allow the DFT to be calculated accurately: the wet film comb is damaged; the wet film comb is not being used correctly; or the paint has additional (unmeasured) thinners added, which are not reflected in the wet to dry ratio quoted for the paint. It should be possible to determine if the wet film comb is damaged by inspection.

ASTM D 4414 gives some guidance on the possible misuse of the wet film comb. The document recommends that the assessment of the WFT is determined at three locations on the item being coated, and the average value used for the DFT calculation and the range of the readings is noted for the report. Some coatings may not wet the comb; however, the film on the item will show which teeth contacted the film and which did not. The wet film comb may slip on the surface, and such readings should be ignored. The surface being measured may not be flat, and this may cause false readings on the comb.

If wet film measurement with more resolution is required, then the wet film wheel should be considered. The method for the use of the wet film wheel is described in ASTM D 1212 Method A and in ISO 2808-1B.

The wet film wheel consist of three rims, two concentric outer rims, one of which carries the scale, and an eccentric inner rim ground to follow the distances marked on the outer rim. The wheel is rolled through the wet film for a complete revolution and the WFT read off where the film finishes on the inner rim. The DFT is calculated in the same way as for the wet film comb.

The advantage of the wet film wheel is that the scale is continuous, by comparison with the wet film comb, and by rolling the wheel for one complete revolution, any surface tension effect can be averaged out by calculating the average of the two readings.

Antonio Tolotto

Boat S.P.A.

Zinc silicate shop primers are inorganic, rust preventive coatings used mainly in the shipbuilding industry. These products must have excellent welding and cutting properties and are required to present no health hazard to the welder. They must be in accordance with IMO Resolution MSC.215(82) and have to be approved by the IACS Classification Societies that fix the acceptable thickness at which they can be applied without interfering with welding performances.

According to the technical data sheets of the main producers, zinc silicate shop primers are currently applied at 15 microns DFT, with a minimum of 10 and a maximum of 25-30 microns DFT. The roughness of a shot blasted surface is recommended from 30-75 microns (Rz). The recommended application method is airless spray in automatic plants. It is impossible to check the right thickness (wet or dry) of the shop primer with traditional methods.

The roughness of the plate plays a dominant role, because surface profile will affect the coating thickness value displayed by the testing gauge. Roughness will vary from part to part and cause the instrument to overstate the true thickness of the coating. Additionally, shop primers are typically coatings that dry quickly, following the surface profile, because they must also protect the peaks of the shot-blasted surface (15 microns DFT must protect 75 microns!).

By the way, there is a method to check the exact thickness of the paint applied. This method uses a perfectly flat plate (10x50 cm) of steel fixed to a shot-blasted surface just before the plate enters the painting plant. After the plate dries in a few minutes, collect the plate and check. The right thickness is the average of 10 measures on the 50 cm length. You obtain a number (for example, 28). This is NOT the real thickness of the paint applied on the shot-blasted plate. This number must be decreased by 30%: 28-6=22 microns. Twenty-two microns is the right thickness applied on peaks and valleys of the shot-blasted plate. The reason is that when a flat surface is abrasive blasted, the surface typically increases about 30%.

Editor's Note: This question was posted on the daily electronic newsletter, PaintSquare News (PSN), on behalf of JPCL. *Responses, including most of the ones here, were received from PSN readers. All answers have been selected and edited to conform to* JPCL's *style and space limitations. To read other Forum questions and responses, click the* JPCL *Problem Solving Forum of any issue of PSN. If you would like to receive PSN, visit www.paintsquare.com.*

A Case of Premature Coating Failure on the Interior Surfaces of Bridge Box Girders

By James D. Machen, Senior Coatings Consultant, KTA-Tator, Inc.
Richard Burgess, Series Editor, KTA-Tator, Inc.

What are exposure conditions like inside the large box (tub) girders of a bridge? Should they be considered interior surfaces or exterior surfaces? Whatever you consider them, as this case shows, girder interiors should not be ignored surfaces.

During an annual inspection of a bridge spanning a major coastal waterway, inspectors observed coating problems on the interior of box girders. The bridge, which spanned brackish (salt) water, had been constructed and coated only five years earlier, yet the coating systems on the girder interiors had significant pinpoint rusting, cracking, and peeling. A coating consulting engineering firm was contacted to investigate the premature coating problems.

Background

The steel girders—a bolted box design—provide the primary support for the system of steel floor beams and other framing steel that holds up the concrete roadway deck. The box girders were fabricated with the steel plates bolted to large steel angles at the interior corners. Steel plate diaphragms, with manway openings, were spaced along the length of the girders. The girder interiors were nearly large enough for an average size person to walk through without hitting his or her head.

Before shop assembly of the girders, individual components were abrasive blast cleaned in the shop to an SSPC-SP 10, Near-White Blast, and primed with the specified organic zinc primer. After assembly, the girder sections received two coats of white polyamide epoxy, also in the shop. The three-coat paint system was to be applied at a 3.0- to 6.0-mil thickness per coat and have a total system dry film thickness (DFT) ranging from 9.0 to 18.0 mils.

The field painting contractor was responsible for repairing and touching up any damage to the coating system resulting from shipping, handling, and field erection.

Field Visits

The coating consultant who investigated the interior girder coating problems accessed them through the numerous manways along the bottom face of the girders.

Figs 1 and 2: Rusting on bolted connection in girder ends. Note moisture and/or ponding water. Photos courtesy of KTA-Tator, Inc.

The following inspection and tests were performed, and the findings were obtained during the field visit.

Visual Inspection

First, the consultant inspected and characterized the condition of the existing coating system.

Visual examination revealed varying degrees of coating problems in all girders. Most defects were concentrated on the floor and along the large support angles in the corners to which the floors and the side walls were bolted. The inspection also found a few isolated instances of coating defects (i.e., cracking, peeling) along the support angle bolted in the upper corners, between the tops and side walls of the girders. Although the vast majority of the coating system on the girder ceiling and side walls was in good condition, the following conditions and issues were identified that contributed directly to coating problems.

• Water was leaking into the girders. Free moisture was seeping through the crevice between support angles bolted to the top corners of the box girders and the side walls. Rust was evident in this crevice, and the resulting rust stain was running down the side walls. In isolated areas along the top angle, rust originating at the crevice was undercutting the coating system, resulting in cracking and peeling on the side wall directly below the angle. Water was ponding on the girder floor, particularly at the girder ends between the first few

Continued

diaphragms. Water staining and rust staining were on the floor, primarily on and along the lower support angles bolted in the corner between the floor and the side walls (Figs. 1 and 2). In some instances, water staining and rust staining was evident immediately in front of diaphragms further away from the girder ends, suggesting that significantly more water had entered the girder than was present during the inspection.

• Individual shavings and larger, ribbon-like balls of metallic shavings were on the floor of the girders (Fig. 3). The metal shavings were remnants from holes drilled in the sides of the girders during construction. A fine metallic particulate dust was on the surface of the coating in some areas. The particulate came from grinding operations during construction. The metallic debris had rusted and caused staining of the white finish coat. In addition, water flowing inside the girders had carried the metallic debris to adjacent surfaces, where rust staining then spread. In several locations, a knife was used to scrape metallic particles from the coating surface. After scraping away the metallic particles, the investigator saw that what initially was believed to be pinpoint rusting through the white topcoat was actually rusted metallic particles on the surface of the white topcoat.

• Cracked and peeling coating was on the floor of the girders. These problems were prevalent on and along the support angle bolting the girder side walls to the floor. Rusting started in the crevice between the angle and the floor, then progressed outward, undercutting the coating and causing cracking and peeling of adjacent coating films on the girder floor. This same condition was observed in a few isolated instances where moisture was seeping in along the support angle bolted in the corner between the side wall and the top of the girder. Rust started in the crevice between the support angle and the side wall, and then progressed downward, undercutting and causing cracking and peeling of the coating system on the side walls.

Fig. 3: Metal shavings rusting

Fig. 4: Uncoated bolts rusting

• Uncoated steel nuts were in multiple bolt patterns within the girders (Fig. 4). Numerous uncoated steel nuts had been installed and were not field painted, which resulted in rust staining across the white finish coat. In addition, extra uncoated raw steel nuts were left scattered on the floor, which also rusted and stained the white finish coat.

• Pigeon debris and nesting litter were at the base of diaphragms near the manway openings. Apparently, during or after construction, the manways were left open, allowing the pigeons to enter the girders.

Dry Film Thickness Measurements

Thickness of the coating system was determined with an electronic (Type 2) DFT gage that operates using a magnetic principle.

DFT measurements ranged from 9.0 to 21.0 mils, with most meeting the specified range of 9.0 to 18.0 mils. While some thickness measurements were slightly higher than specified, there was no correlation between coating thickness and the cracked and peeled coating. Thus, the isolated readings outside the range were not a cause for concern and could reflect touchup or stripe coating.

The total number of coats present, and the thickness of each, was determined destructively using a Tooke Gage. Field coating samples were later examined microscopically in a laboratory to determine the number and thickness of each coat.

Tooke Gage measurements identified three individual coats of paint and total DFTs consistent with those obtained by the Type 2 electronic gage measurements.

Adhesion Testing

Coating adhesion was measured in accordance with ASTM D 3359, "Standard Test Methods for Measuring Adhesion by Tape Test," using Method A (X-Cut Method). ASTM adhesion ratings of 4A to 5A indicated that the coating system had good adhesion, except where cracking and peeling were obvious.

Field Samples

Representative coating samples from failing and non-failing areas, along with water samples from ponding in the girders, were taken for laboratory analytical testing.

Continued

Laboratory Test Results

The laboratory investigation consisted of chloride concentration determination in the water samples and a microscopic examination of paint chips.

Chloride Concentration

Water samples taken from ponding water areas within the girder showed significant chloride concentrations (up to several thousand parts per million).

Microscopic Examination

Paint samples examined with a digital microscope (magnification 200X) identified three coats of paint with individual layer and total DFTs consistent with those obtained by Tooke Gage and electronic field measurement.

Discussion

The field and laboratory investigations identified multiple factors that contributed to the coating problems on the interior surfaces of the girders. The factors and their relative significance are described below.

Moisture

Moisture seeping into the girders was a significant factor. Water staining and rust staining down the side walls indicated that the moisture was entering through the gap or crevice between the angles bolted to the top and side walls of the girders (Fig. 5). Rust was visible in this crevice area, and in areas where the rust spread to the side walls, undercutting the paint film and causing cracking and peeling. Moisture running down the side walls accumulated (ponded) on and around the support angles bolted to the girder floor and side walls, and in some cases accumulated at the base of diaphragms. Rusting was also prominent in the crevice between the support angle bolted to the floor and side wall. In many areas, rust spread from the crevice and undercut the coating system on the floor of the girders, resulting in cracking and peeling. Eventually, the water flowed to the low points at the girder ends. There, several inches of water had accumulated and had created a water immersion exposure environment for the coated areas of the girder ends. While the organic zinc and epoxy coating system applied in the girders was able to resist this exposure for a short duration, the coating system was not designed for immersion service, so failure eventually occurred. Compounding the moisture problem was the corrosivity of the water because of its chloride (salt) content. Ultimately, the coating system in ponding water areas was subject to an accelerated corrosion rate from immersion in salt water.

Fig. 5: Indications of moisture leaking from the top crevice of box girder.

Uncoated Steel

The uncoated nuts and bolts on the girder floor and floor angle, as well as the many uncoated bolted connection areas, contributed to the failure. Where frequent moisture or ponding water was present, these raw steel nuts/bolts and unpainted areas were severely rusted. As water flowed through the girder, rust from these areas stained adjacent surfaces.

Construction Debris

Another factor was construction debris: the unused raw steel nuts left on the floor of the girders, the ribbon-like pieces of metal from hole drilling in the girders, and the metallic dust-like particles from grinding (Fig. 6). The debris should have been removed after construction. Instead, left on the site, the metallic debris had rusted and stained the white topcoat. The rusted metallic particles on the white topcoat had the appearance of pinpoint rusting. Even though the staining was on the surface of the coating, these surfaces will require time for examination at each subsequent inspection as a direct result of the rusty appearance.

Continued

Open Manways

Manways on the girders were reportedly left open for some period. As a result, pigeons nested, and their litter and nesting debris had accumulated in many areas of the girders, particularly at the base of diaphragms near the openings. Pigeon litter, especially in contact with moisture, is not just corrosive but is also a potential health hazard for workers during repair and future inspections.

Fig. 6: Metal washers, metallic shavings, and nuts rusting and staining the coating.

Recommendations

The most obvious concern was the chloride-laden moisture seeping into and ponding within the girders. The coastal environment and brackish water over which the bridge spans provided a constant source for these chlorides. This condition is very corrosive and, if not mitigated, would continue to attack the coating system. This problem was minimized by applying caulk/sealant to the exterior of the girder where moisture was entering. However, because caulking is only a temporary measure to prevent moisture intrusion into the girder, it will be necessary to provide long-term maintenance (repair and replacement) of the caulking to minimize moisture intrusion.

Field cleaning, repairing, and repainting the interior of the girders also presented many challenges (i.e., confined space issues, paint flammability/vapor/ventilation issues, worker safety issues). Because of these issues, abrasive blast cleaning and the use of repair coatings containing volatile solvents was problematic.

Ultimately, pressurized water cleaning was used on the girder interiors. Pressure water cleaning also provided for the removal/remediation of the water-soluble chloride concentrations

Fig. 7: Blistered and peeling coating on girder floor. Note that blisters are more concentrated along the crevice of the bolted angle to the floor.

that were present. Use of pressure washing also introduced moisture and additional water that had to be removed before any maintenance painting could be undertaken.

Because coating problems were primarily confined to the floor of the girders (Fig. 7), only the floor needed to be totally cleaned and recoated. Spot repairs were all that were needed to address the coating problems on the girder top and side wall surfaces.

Because of the safety and health issues associated with this work (paint flammability/vapor/ventilation issues), a solvent-free epoxy product designed for brush and roller application was specified. Selection of this product reduced worker safety concerns while still providing a high performance protective coating film.

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Sizing DH for Water Tank Lining Jobs

There is a lot to consider going from Tupelo to Tehachapi.

Courtesy of the author

By Don Schnell, Dehumidification Technologies, LP

Since dehumidification (DH) was first introduced to our industry, back in the 1970s, we have been debating and wrestling with the cost of using this technology in the protective coating work for structures such as water tanks. On the first tank lining projects, over four air changes per hour were recommended, only because there was no experience with "holding the blast," and the suppliers of this new technology were trying to find a base line for a successful application. During the past 30 years, the application of climate control has matured significantly. The desiccant dehumidifier designs have advanced, and the use of refrigeration as dehumidification has become common. This article focuses on sizing DH for water tank lining projects, showing that sizing depends considerably on the goals for climate control as well as on all project conditions of the tank, from geographical location to weather conditions and project specifications.

Goals for Climate Control

The first step in determining the right equipment (See Technical Tip 1) is to understand the goals for climate control. These are a few basic and typical goals.

1. Preserving the blast-cleaned surface until the primer or coating is applied
2. Maintaining surface temperatures for coating application and cure
3. Providing worker comfort

If a goal is to preserve the blast-cleaned surface, we know that it will be necessary to maintain the relative humidity (RH) below 50% at the surface. Research has told us that corrosion rates increase dramatically when the RH climbs above 50%. Since it changes with temperature, RH is strongly impacted by the surface temperature (See Technical Tip 2).

RH at the surface can also be expressed as a difference between the surface temperature and the dew point (temperature at which moisture condenses on steel) in the space. On a psychrometric chart, it can be shown that when the surface temperature is 17-20 degrees above the dew point, the RH at that sur-

Technical Tip 1:

What is the difference between a desiccant and a refrigeration type dehumidifier? In a desiccant unit, the air is passed over a desiccant, such as silica gel, that attracts the moisture from the air. The desiccant is then rotated through a heater chamber that regenerates the material so it can attract more moisture. A refrigeration type dehumidifier is different in that the air is passed over chilled coils where the temperature is lowered below the dew point temperature. This causes the moisture in the air to condense on the cooling coils and is then drained away. In a desiccant unit, the air is discharged at a lower dew point but higher temperature, while a refrigerant dehumidifier discharges air at a lower dew point and a lower temperature.

face will be around 50%. This is why it is often recommended that the dew point temperature be kept below a point that is at 15, or sometimes 20, degrees below the surface temperature to preserve the blasted surfaces. (The often-heard 5 degrees below the dew point is a minimum required to avoid actual condensation.)

Maybe you have determined that surface temperatures will be too low for the specified coating to be applied or cured. The most common solution to this problem is to heat the air inside the tank. In simplest terms, the steel temperature will be between the inside and the outside temperature. As the wind removes the insulating layer of air from the outside surface, the steel is further cooled by the outside air. In the same way, air movement on the inside removes the insulating layer of air and allows the steel to be warmed by the heated air in the tank. On a cool, clear night, radiational cooling also works against efforts to heat the tank. The steel surfaces, particularly on the roof, lose additional heat to the atmosphere, just as does the roof of your Tahoe or Taurus.

It is possible to calculate the expected surface temperature of a tank using a very complex formula that considers surface area, inside and outside temperatures, inside and outside wind speed, and the radiational cooling. Heater suppliers use spread sheets to calculate these heat losses. The result is in BTUs per hour of heat lost through all the surfaces of the tank. Heaters are measured in BTUs, and the heat loss in BTUs is the primary factor needed to determine how big the heater must be. The airflow through the heater must also be considered because BTUs are lost as the air exits the tank on the other side. (See Safety Tip.)

If worker comfort is important, we must consider surface temperature and air temperature. At elevated temperatures, workers must take more frequent breaks, which is a big drain on productivity. This goal can be helped or hindered by other objectives for climate control. For example, in Thief River Falls, Minnesota, it may require 110 F air temperature to maintain a 50 F surface temp. But 110 F creates a very hostile work environment. In this case, insulation may be necessary to lower the heat required, or a more temperature-tolerant coating may be needed, as long as the owner agrees to the change. In Tupelo, Mississippi, where average summer high temperatures are over 90 F, a DH system that includes some cooling is more efficient and more comfortable.

Technical Tip 2:

The air adjacent to the surface in the tank is virtually the same temperature as the surface. As an example, in air that is 75 F and 30% RH, the RH will increase to 72% near a surface that is 50 F.

Know Your Project Conditions to Calculate Your DH Needs

The amount and type of dehumidification required is affected by project conditions and weather conditions. Understanding project conditions requires addressing the following:

- Is the applicator attempting to preserve the cleaned surface and for how long?
- Is the tank steel or concrete?
- How many openings does the tank have or is it well sealed?
- Is the tank insulated, contained, or in a building?
- What conditions are required for coating application and cure?
- Are there other sources of ventilation such as dust collection?

Understanding weather conditions requires addressing the following:

- What are the expected dry bulb (air) and dew point temperatures?
- What is the expected wind speed?
- What are the expected high and low temperatures?

Safety Tip:

Although common sense would tell us to re-circulate conditioned air back through climate control equipment to save energy and increase performance, re-circulation can create some serious hazards. Without introducing fresh air into the tank, solvents and fine dust particles will build up, causing hazardous and even explosive environments. Also, re-circulating solvent vapors or dust-laden air can destroy components in dehumidifiers, such as very expensive desiccant rotors. Never re-circulate air through climate control equipment during coating application.

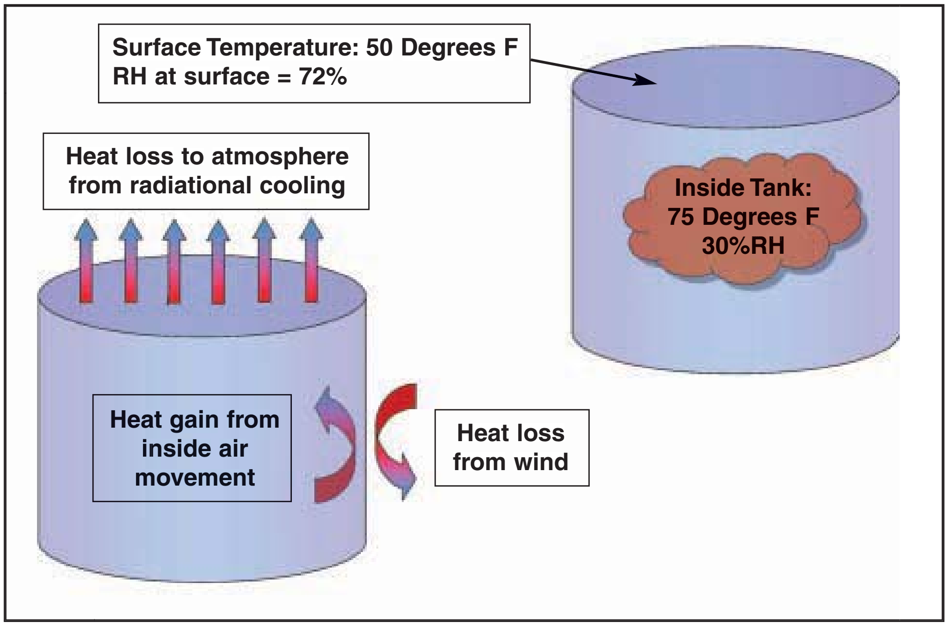

Fig. 1: Factors that affect surface temperature
Courtesy of the author

Technical Tip 3:

Air changes are calculated as (interior volume X required air)/60 min. = DH capacity in cubic feet per min. (cfm).

In today's industrial coating work, we often find DH recommendations based on loose and general rules of thumb. These "rules" are often based on standard equipment and the number of air changes that the unit will supply per hour in a tank or space. An "air change" is when the volume of air in a tank is completely displaced by the ventilation system. The "rules" are also all too often drawn from limited experience (sometimes, very limited experience) or assumptions about what might be considered typical conditions.

The volume of air in a cylindrical shape is calculated as follows: radius X radius X π X height. (See Technical Tip 3.)

Expertise is needed to determine the number of required air changes per hour. With the advances in the technology, it becomes more advantageous to spend the extra effort to understand the project and to be sure that the best technology and the best equipment are used. The pay-off for this effort should be cost savings, fuel savings, improved reliability, and shortened work schedules.

Consider the most common rule of thumb: two air changes per hour. This recommendation is solid if you are using desiccant units in a one-million-gallon tank in Topeka, Kansas, in May, when the average temperature is around 65 F. Experienced dehumidification people know that we can preserve the blast-cleaned surface well in this scenario. Otherwise stated, "the dew point temperature in the tank will be lower than 15 degrees below the surface temperature" or "the RH will be lower than 50% at the surface."

Move this same one-million-gallon tank to Tampa, Florida, with 90 F highs and a 75 F dew point temperature, and refrigeration DH at four air changes per hour might be more appropriate. But be careful: you might not be able to hold the blast very long. A little-understood fact is that refrigeration dehumidification loses its effectiveness as temperatures drop below 65 F. This can be illustrated by starting with the expected surface temperature and remembering the all-important 15-degree F spread between the dew point and surface temperature. Let's start with the assumption that the surface temperature equals the ambient air temperature—65 F. To preserve the blast, the dew point in the tank must be 15 degrees F lower, or 50 F. For a cooling unit to accomplish this, it should be delivering air colder than 40 F to overcome infiltration and other moisture loads. For a cooling unit to deliver air at 40 F, the coils themselves will be approaching freezing temperatures. Although there have been significant innovations to defrost cooling coils, they all begin to lose effectiveness as ice builds up on the coils.

To further complicate things, on a clear night, roof temperatures can reach low temperatures almost 10 degrees below the ambient temperature. Another important consideration is that the typical refrigeration dehumidifier in the industry has a fixed process air blower, meaning that it delivers a specific fixed air volume. A refrigeration unit's ability to lower the dew point temperature is in proportion to the speed at which the air passes over the cooling coil. At the typical air speed, the unit may be capable of lowering the dew point temperature only a few degrees, and the blast may turn because you cannot maintain that all-important 50% relative humidity at the surface.

If you intend to preserve the blast

with refrigeration DH, it is also important to re-heat the air after cooling it. This sounds like a waste of energy but by re-heating the air after it has been cooled to lower the dew point temperature, you are raising the RH where it enters the tank. Also, by re-heating, you avoid cooling the surface temperatures at night and losing that 15-degree dew point spread.

Technical Tip 4:

Why does it take fewer air changes per hour to control a large tank? A dehumidifier's ability to control conditions in a tank is affected by the amount of infiltration of ambient air and internal moisture sources. This determination is largely a function of the ratio of the volume of the space to the area of the openings in the tank. To illustrate, consider a 100,000 gallon tank with two 30-inch manholes and a one-million gallon tank with two 36-inch manholes. The ratio of volume to the openings in the small tank is 1,365 cubic feet/square foot of opening where that ratio is 9,469/1 in the one-million gallon tank. There is seven times the infiltration potential on the smaller tank.

Combining refrigeration with precooled desiccant dehumidification presents a very effective solution in warmer climates, and you might be well served with less than one air change per hour. This combination allows the operator to get the aggressive dew point control of the desiccant unit and the benefit of cooler air during the day. In more humid environments, the cooling unit removes a lot of the moisture, and by feeding the desiccant unit with that drier, cool air, its performance is also improved.

On a five-million-gallon water tank in Troy, New York, two air changes are probably a big waste of taxpayer money. With this large volume space (670,000 cubic feet), the air is stabilized and not as affected by infiltration. Don't try to use refrigeration on this job. No amount of cooling will preserve your blast when the surface temperature is 40 F.

The exact amount of dehumidified air can be calculated if the weather conditions are known and we can quantify every infiltration source and every internal load on the job. In reality, it is not practical to perform this in-depth engineering exercise on each tank, and in fact, we cannot predict all of these loads accurately. Air flow, compressor capacity, and infiltration are all subject to change by the day and hour. In addition, if the calculation called for 2,853 cfm with a desiccant unit, the equipment supplied would be rounded up to a commercially available 3,000 or 3,500 cfm machine. This is why most recommendations are based on experience, aided by weather data and site conditions. The more experience...the better the recommendation. (See Technical Tip 4.)

There is a misconception that the dehumidification volume must match the dust collector, cfm for cfm. Depending on your choice of DH system, you may be able to allow large amounts of ambient air to mix with the DH and still maintain the proper conditions. Again, what works in Toledo, Ohio, may not work in Tulsa, Oklahoma.

Have you ever been to Towner, North Dakota? The average winter temperature is about 15 F. If you heat the surface up to 40 F for coating, it will be 25-30 degrees above the dew point temperature. In effect, you are creating the same dew point spread as would a dehumidifier. You might want to think about insulating this tank. Without insulation, you will need over 110 F inside to maintain that surface temperature at 40 F.

The other extreme is when the surface temperature is very high. In Tucson, Arizona, a pre-primed tank may not require a wide dew point spread because you may not be holding the blast. Your objective may be to control condensation and provide a habitable work environment. Traditional refrigeration may be a great choice. Don't let the desert weather fool you. A dew point of 65 F is not uncommon in the summer months. Even if you are holding the blast, your requirements change when you are all primed out and just coating.

What about a concrete tank in Tehachapi, California? You might need to remove the excess moisture from the concrete. If this is your goal, you will need to be very aggressive with the dew point spread. This will create an extreme difference between the moisture content in the concrete and the moisture content in the adjacent air, causing the moisture to quickly migrate from the concrete. Heat can also be helpful. There are a lot of dynamics in play here as we deal with vapor barriers, buried surfaces, efflorescence, out-gassing, and porosity. If your only issue is to keep a dry substrate, just make sure the surface is five degrees above the dew point temperature. Again, there is no simple formula, but the good news is that you don't need to worry about holding the blast in a concrete tank.

What about Costs?

This conversation would not be complete without some discussion around costs. The sad fact is that much of the focus comes down to rental rates when even the most drastic discount on rates is quickly overshadowed by the right choices of equipment, energy sources, and even delivery options. All energy sources should be explored carefully. By finding line power on a recent project, the customer was able to save over 33% of the entire cost of the climate control. Even after some expensive electrical work and paying for the electricity, the contractor was able to reduce these costs by eliminating a portable rental generator and the expensive diesel fuel to run it.

Conclusion

Unfortunately, sizing climate control is not as simple as calculating spread rates on an epoxy coating or abrasive consumption rates. By considering all of the parameters and all of the available technologies, large sums of money can be saved. Sizing DH may not be rocket science, but it is a science. Very different rules apply in Biloxi, Mississippi, than in Bellingham, Washington.

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JPCL

Preparing an Inspection Plan for Bridge Maintenance Painting

By William D. Corbett, KTA-Tator, Inc.

Editor's Note:
This article is based on a paper the author presented at SSPC 2011, the conference of SSPC: Society of Protective Coatings. The original paper is in the Proceedings of SSPC 2011 (www.sspc.org).

A bridge coatings specification can be complex and confusing. Yet it is regarded as the rulebook for quality control and quality assurance personnel responsible for inspecting the work. An inspection plan can streamline understanding the inspection checkpoints that a bridge coating specification invokes and can be a key communication tool for contractor and inspection personnel. This article reviews the purpose and benefits of developing an inspection plan and reviews the content of SSPC's *Guide for Planning Coatings Inspection*. Two formats for inspection plans are illustrated, and how to populate an inspection plan based on the requirements of a bridge coating specification is demonstrated.

Why Prepare an Inspection Plan?

Why should a quality control or a quality assurance inspector prepare an inspection plan when all of the inspection requirements and acceptance criteria are already described in the specification?

A thorough, well-organized inspection plan provides an inspector with a systematic tool that covers each phase of work in the sequence in which it will likely be performed. In general, an inspection, plan is a written document that lists what must be inspected, how it is to be inspected, and the acceptance criteria from the specification. The process of developing an inspection plan provides the inspector with an opportunity to carefully navigate through the contract, extract the inspection check points, and transfer them to a separate chart that can be referenced throughout the project to clearly understand and communicate the quality requirements of the specification.

Some specifications require the contractor to develop a Work Plan and a Process Control Plan or PCP. The inspection plan is a component to the Process Control Plan. These items, considered "submittals," often must be approved before production operations are allowed to begin.

Bridge coating specifications often contain multiple parts, sections, and items. The quality requirements for a bridge coatings project are often in the Execution component of the specification but may also be scattered in other parts or sections.

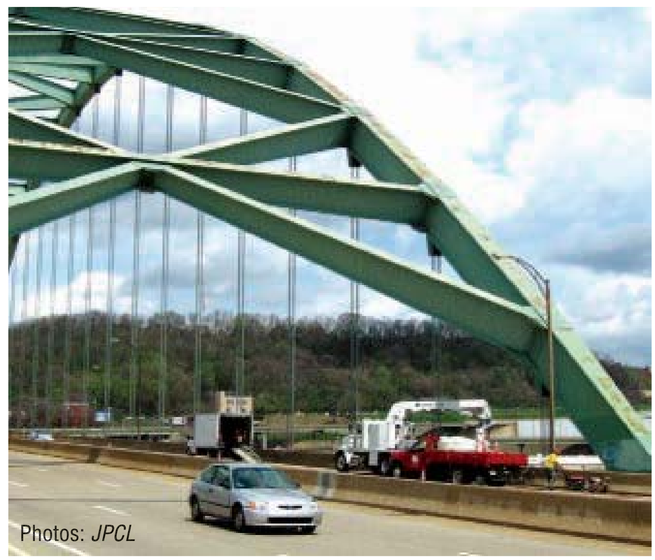
Proper inspection doesn't happen by accident. One of the many keys to quality inspection is careful planning so that each check point is properly inspected using the techniques, instruments, standards, guides, and test methods established by the industry to verify the adequacy of the work before proceeding to the next step.

Developing a well-organized, thorough inspection plan before starting production activities (surface preparation and coating work) can help quality assurance and quality control inspection personnel verify that each of the specification requirements will be inspected. It is a key communication tool between contractor and inspector personnel.

SSPC Guide for Planning Coating Inspection

SSPC's Painting Contractor Certification Program or PCCP, which oversees SSPC's Qualification Procedures, such SSPC-QP 1 and SSPC-QP 3, requires the contractor to prepare a quality control plan. Many of SSPC's coatings inspection training courses include the preparation of inspection plans in the curriculum. To provide guidance to those responsible for creating quality control plans and a training document to course participants, SSPC developed a *Guide for Planning Coating Inspection* in 2008.

The *Guide* first describes the importance of quality monitoring on a project to reduce the risk of coating failure and describes the challenges of trying to assess quality after a project is complete. The *Guide* also stresses the importance of planning the inspection to increase the likelihood of properly performing inspections and documenting the results. The intended purpose of the guide is to assist coating inspectors, quality control personnel, and owners with the development of a tool to help ensure the coating or lining installation is the best it can be. The facility owner's, contractor's, and coating inspector's responsibilities for managing project quality are also described in the *Guide*. The owner's responsibility includes developing the project specification and performing quality assurance inspection of the work (unless the inspection task is contracted to a third party). The contractor's responsibility includes purchasing the coating materials; performing all surface preparation and coating installation work; controlling the quality of the work; documenting and resolving non-conformities with the owner; and preparing corrective action reports so that non-conformities do not reoccur. The quality assurance inspector's responsibility is to observe the work performed, assess whether it meets the minimum requirements of the specification, document the results of the inspection, and report to the owner.



Photos: *JPCL*

The *Guide* also calls for the preparation and implementation of an inspection plan so that an inspector can work thoroughly and efficiently. The *Guide* describes a typical scope of an inspection plan and recommends that the plan include a project schedule that matches the contractor's Work Plan. The scope and schedule allow the inspector and contractor to coordinate inspection and production activities without unduly interrupting production. The *Guide* also describes a plan format, which will be illustrated later in this article.

The documents typically required to prepare an inspection plan, the equipment typically required to perform inspections, and a list of common inspection hold points and check points are described in the *Guide*. We will look at each of these items in detail, since they are all vital to the preparation of a quality inspection plan. Finally, the *Guide* provides a sample coating inspection plan for an amine-cured epoxy coating or lining applied to a carbon steel structure, as well as an inspection plan for coating of concrete.

Required Items for Inspection Plan Development

Four documents or references will be used during the development of an inspection plan. They include a copy of the specification and any notes from the pre-construction conference that may become part of the specification; and all of the referenced standards from the

Inspection Plan Format (simple)

Inspection Item	Technique/Instrument	Acceptance Criteria
Verify pre-blast surface cleanliness	Visual	Removal of all visible grease, oil & debris
Verify correct type and cleanliness of abrasive media	Visual & conductivity meter	Expendable, angular slag, no visible oil; < 1,000 µS/cm
Verify compressed air cleanliness	Blotter test	Clean, dry air; no evidence of water or oil
Verify installation of protective coverings	Visual	Properly installed & maintained

Fig 1: Example of the simple (three-column) inspection plan format, which provides the basic information for the inspector. Figures courtesy of KTA-Tator.

specification, including those from SSPC, NACE International, ASTM International, and others. Current product data sheets, application instructions, and material safety data sheets (MSDS) from the coating manufacturer for each product to be applied are also acquired. Technical data sheets and MSDS should also be obtained from the abrasive supplier or any supplier of surface preparation-related products or chemicals. While MSDS have little to do with quality, they are required to be on-site and read and understood by all personnel who will potentially come into contact with the product during its use.

The project specification should be read carefully to identify each requirement and the owner's expectation. It may be beneficial to highlight the inspection requirements as they are read. Recognize that the requirements may not be stated in the specification in the order that they will occur during execution of the work; for example, a specification may establish the surface preparation requirements, then requirements for containment of the structure, followed by requirements for a certified coatings inspector. The specification should establish each inspection test method to be used, the equipment necessary to perform each test, and the frequency at which each test should be performed. If these items are not included in the specification, then they should be addressed at the pre-construction conference. Referenced standards detail how to perform a specific test but typically do not identify how frequently the test should be performed.

All inspection equipment necessary for a successful inspection should be verified for accuracy before starting work and maintained in good working order throughout the project. The inspector should maintain a log of the inspection equipment used on each project.

Inspection Plan Format

There is no standard format for inspection plans. The format may be dictated by the specification, or may be customized based on inspector preference. This article illustrates two formats: a simple three-column format and a more complex six-column format.

The simple format contains three column headers: one to list the inspection check points from the specification; one to list the methods and instruments that will be used to perform the inspections; and one to list the acceptance criteria corresponding to each inspection check point, which is provided in the specification. Figure 1 shows the three-column format; note, however, that the simple format does not indicate how often to perform a test, nor does it list the test method to be used.

The more complex format contains the same three columns shown in Fig. 1 but includes three more columns to list the testing frequency; the standard test

Inspection Plan Format (complex)

Inspection Item	Technique/ Instrument	Frequency of Tests	Standard Test Method Reference	Spec. Reference	Acceptance Criteria
Verify pre-blast surface cleanliness	Visual	100% of surface	SSPC-SP 1	3.4.2	Removal of all visible grease, oil & debris
Verify correct type and cleanliness of abrasive media	Visual & conductivity meter	Each lot of abrasive	SSPC AB 1 ASTM D 7393 ASTM D 4940	2.3.1	Expendable, angular slag, no visible oil; < 1,000 µS/cm conductivity
Verify compressed air cleanliness	Blotter test	Twice per work shift	ASTM D 4285	3.4.7	Clean, dry air; no evidence of water or oil
Verify installation of protective coverings	Visual	Prior to surface preparation and painting	NA	3.4.1	Properly installed & maintained

Fig. 2: Example of complex inspection plan format, which provides inspectors with a tool more complete than the simple format

Inspection Plan for Maintenance Painting of a Bridge Structure

Inspection Item	Technique/ Instrument	Frequency of Tests	Standard Test Method Reference	Spec. Reference	Acceptance Criteria
Verify grease/ oil removal	Visual and/or water break	100% of surfaces, prior to surface prep.	SSPC-SP 1	45-2.03	No visible oil or grease contamination
Verify surface chloride removal	Latex patch/sleeve Cl^- strip/tube	Three tests per 1000 sq. ft.	SSPC Guide 15	45-2.03	< 7 µg/cm²
Verify correct abrasive type & cleanliness	Visual; Vial test (oil); Conductivity meter	Each lot	SSPC AB 1; Oil: ASTM D 7237 Conductivity: ASTM D 4940	45-2.04	Expendable; angular; no oil; <1000 µS/cm
Verify compressed air cleanliness	Blotter test	Once per shift	ASTM D 4285	45-2.04	No visible oil or water on collector
Verify post - blast surface cleanliness	SSPC VIS 1	100% of surfaces, prior to primer appl.	SSPC-SP 10	45-2.04	Near-white Blast

Fig. 3: Example of checkpoints relating to pre-and post-surface preparation inspection

method reference; and a reference to the specification part, section, and item number for each inspection checkpoint (Fig. 2). The "Specification Reference" column is particularly useful when there is a need to go back into the specification for confirmation, clarifications, etc. It directs the user to the section where the inspection check point and the acceptance criteria are indicated. This format is preferred since it provides inspection personnel with a more complete tool.

Hold Point Inspections

Hold points are designated stages of a coating project at which production stops, and the work is inspected for conformance. If an inspection does not occur at a hold point, non-conforming work may be coated over, or the structure may be put into service with a compromised coating system, which may lead to failure. When inspections occur at hold points and non-conforming work is corrected before proceeding to the next step, the risk of coating failure is reduced.

Common hold points include pre- and post-surface preparation, surface condition prior to coating, coating application, post-coating application, curing, and final inspection. Note that each of these hold points has multiple check points, each of which should be listed on the inspection plan.

• Hold Point 1: Pre-surface Preparation

Many specifications require contractors to prepare a number of submittals for the owner before beginning work. These submittals often include detailed progress work schedules, worker safety plans, waste management plans, and other engineered drawings or plans.

Before the contractor begins surface preparation, the inspector verifies that the contractor has acquired the appropriate surface preparation media based on the requirements of the specification.

Containment materials, installation of the containment and ventilation system, required air and site monitoring, and waste management plans are also verified for conformance to the specification requirements and submitted.

In addition, the surface of the structure is examined for surface contamination, such as heavy deposits of oil, grease, debris, or soluble salts, which generally require pre-cleaning and inspection before mechanical surface preparation begins.

Although Hold Point 1 is identified as pre-surface preparation, some of the inspection checkpoints such as ambient conditions, surface preparation media, and removal of surface contamination are verified or inspected before *and* throughout the surface preparation phase of work.

• Hold Point 2: Post-surface Preparation

Checkpoints at Hold Point 2 include examining the surface after mechanical preparation for cleanliness as well as for surface profile yield if the latter is invoked by the contract documents.

Inspection Plan for Maintenance Painting of a Bridge Structure

Inspection Item	Technique/ Instrument	Frequency of Tests	Standard Test Method Reference	Spec. Reference	Acceptance Criteria
Verify surface profile depth	Visual comparator Depth micro. Replica tape	Three tests per area cleaned, per shift	ASTM D 4417 Methods A, B, or C	45-2.04	1.5-3 mils
Verify surface prep.-to-primer interval	Visual	After final surface prep., per area	NA	45-2.04	Within same day as blast cleaning
Verify dust removal	Visual/tactile	Prior to primer appl.	NA	45-2.04	No visible dust
Verify correct coating mat'ls.	Visual	Prior to surface prep.	NA	45-2.05	OZ/EP/PU from 1 manufacturer
Coating Thickness	Calib. dry film thickness gage	After each coat	SSPC-PA 2	45-2.05	Primer: 3-5 mils Interm: 5-7 mils Finish: 2-3 mils
Verify finish coat color	Visual (check label)	Prior to finish coat appl.	NA	45-2.05	Fed. Std. 1518 No. 23456

Fig. 4: Example of checkpoints relating to post-surface preparation and coating application inspection

Inspection Plan for Maintenance Painting of a Bridge Structure

Inspection Item	Technique/ Instrument	Frequency of Tests	Standard Test Method Reference	Spec. Reference	Acceptance Criteria
Measure ambient conditions & surface temp.	Sling psychrometer; psychrometric charts; surf. thermometer	Prior to coating mixing and 4 hr. intervals	ASTM E 337	452.06	Air & Surf. Temp: 40-100 F RH: <85% ST +5°F of DP
Verify proper mixing of coatings	Visual	During mixing	NA	452.07	Mechanical mixing blade
Verify straining of primer	Visual	Prior to trsfr to spray pot	NA	452.07	Strained
Verify proper thinning	Visual	Prior to addition	NA	452.07	Type & amount per manuf. PDS
Verify lighting	Light Meter	Prior to production	SSPC Guide 12	452.07	Surf. prep & ctg. appl.: Min 20 fc
Verify lighting	Light Meter	Prior to inspection	SSPC Guide 12	452.07	Minimum 50 fc

Fig. 5: Example of checkpoints relating to lighting and coating material preparation inspection

Surface imperfections caused by surface preparation operations are documented and addressed before coating system application. Finally, the inspector may also be required to verify that the waste generated during surface preparation activities is properly stored and secured until it can be removed from the project site. As with Hold Point 1 checkpoints, some Hold Point 2 checkpoints occur during the surface preparation process.

• Hold Point 3: Surface Conditions for Coatings Application

Checkpoints for conditions for coating application include inspection of prepared surfaces for dust or other debris that may inhibit surface wetting of the coating or adhesion; verification that the air and surface temperatures as well as the relative humidity are within the allowable ranges; and verification that the surface temperature is high enough above the dew point to preclude moisture formation on prepared surfaces.

• Hold Point 4: Coating Application

The coating application check points include verification that the coating materials on site are the correct products; have a current shelf life; and are mixed, thinned, and strained according to the manufacturer's instructions. Again, the prevailing conditions of temperature and humidity are measured and recorded, and the applied wet film thickness may be measured and recorded, especially when dry film thickness measurements are not possible. The applied coating should also be inspected for visible defects that occurred during application so that they can be repaired before the next coat is applied. These inspection checkpoints are performed for each coating layer to be applied.

• Hold Point 5: Post-Coating Application

Monitoring and recording ambient conditions throughout the curing process of the coating, observing the minimum and maximum recoat windows, and verifying cleanliness between coats can be significant checkpoints in minimizing premature coatings failure, and are typically performed for each coating layer to be applied.

• Hold Point 6: Post-curing of Coating

Post-curing checkpoints include inspection for visible defects that occurred during application and measurement of dry film thickness (when possible) of each applied coating.

• Hold Point 7: Final Inspection

Final inspection includes examination of repaired areas, as well as removal of waste by a licensed transporter, restoring the site to its original condition, and verification that the contractor has implemented all corrective actions.

Developing an Inspection Plan

Based on the six-column format, examples of parts of an inspection plan for maintenance painting of a bridge are shown in Figs. 3—5. The specification is simulated and not designed to represent an actual contract. Furthermore, the inspection checkpoints are not listed in the precise order in which they would be performed, but rather the order in which they appeared in the simulated project's specification. If an inspection plan is created in an electronic spreadsheet, it can be customized and reorganized with little effort.

Summary

In summary, an inspection plan can make the process of understanding the inspection checkpoints invoked by a bridge coating specification more streamlined and can be a key communication tool for contractor and inspection personnel.

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JPCL

Characterizing Surfaces after UHP Waterjetting in New Ship Construction

By Philippe Le Calvé, DCNS, France; Jean-Pierre Pautasso, Direction Générale de l'Armement, France; and Nathalie Le Bozec, French Corrosion Institute

Surface preparation processes influence the performance and lifetime of coating systems applied to steel substrates. Thus, the state of the steel surface immediately before painting is crucial. The main factors influencing performance are the surface cleanliness (e.g., is it free of rust and mill scale, surface contaminants including dust, salts, and grease) and surface profile. For aggressive environments such as marine atmospheres of corrosivity category C5M and high-performance coatings that require cleaner and/or rougher surfaces, blast cleaning is normally preferred. It is well known that surface preparation using abrasive cleaning in particular can produce a considerable amount of waste containing mainly blasting media and removed paint or rust products.

To reduce the amount of waste generated during maintenance work or complete renovation of ships as well as other structures, ultra-high-pressure (UHP) waterjetting is becoming a common alternative to abrasive cleaning, as long as the performance of the coatings on the steel is not affected. UHP waterjetting technology has been described intensively.[1-3]

To help understand the performance of coatings over waterjetted steel, it is crucial to characterize the surface quality of steel substrates prepared by UHP waterjetting in terms of flash rust, salt contaminants, surface roughness, and related factors.

- Previous work by Le Calvé *et al*. to better understand surface preparation by UHP waterjetting and its influence on coating performances through accelerated corrosion tests and field exposures has already been reported.[4,5]
- One study was dedicated to the extraction and the measurement of iron oxides, as a function of the degree of flash rusting (OF0, OF1, OF2) as described in the standard NF T35-520.[3] It should be remembered that the original state of the substrate is a determining element in the concentration measured. The latter can vary between 4-6 g/m^2 for a level of flash rusting OF1 and higher than 8 g/m^2 for a level of flash rusting OF2. Islam and coworkers used similar techniques.[6]
- A systematic investigation of the influence of flash rust on the performance of four reference paint systems applied in new construction and maintenance operations after UHP waterjetting preparation

Opposite page: First sea trial of the first-of-class frigate, Acquitane (18th April 2011)
Photo reproduced with permission of DCNS

(hand-held gun, 2100 bar*) showed that the method did not lead to coating performance similar to that provided by classical abrasive cleaning (Sa 2½).[4] The study showed a drop in the coating performance as a function of increasing level of flash rust degree from OF0 to OF2, which highlights the importance of the steel surface state before UHP waterjetting.

- The performance of 13 different coating systems applied to UHP-treated steel in maintenance (robot, 2450 bar) was studied in field exposure and laboratory tests and compared to classical abrasive blasted steel.[5] Four coating systems applied to UHP-treated surfaces were found to give satisfactory results, comparable to surface preparation by abrasive blasting.

Although UHP waterjetting is becoming more widely accepted and used for maintenance applications, the suitability of this technique for new construction requires further study. In particular, the secondary surface state of steel after waterjetting a shop-applied zinc-rich holding primer (as in new vessel construction) is not fully described. There is, therefore, a need to better assess the efficiency of waterjetting for such applications.

In response to this need, this article describes the results of a new study on UHP waterjetting for secondary surface preparation in new vessel construction. The article reports on the first part of the study: the influence of cleaning parameters such as flow pressure or type of waterjetting tools in terms of surface cleanliness, roughness, and zinc holding primer remaining on the surface after waterjetting. The results are also compared with a traditional grit-blasted surface. The second part of the study, which will be reported in a subsequent article, addresses coating performance over waterjetted steel in new construction.

**1 bar = 15 psi*

Experimental

Samples and Surface Preparation

Practices for preparing new steel vary among shipyards. To hold the blast on new, abrasive blast-cleaned steel plates, a temporary (holding) primer is applied. In some shipyards, the primer is removed before the specified system is applied, while in other yards, only damaged holding primer is completely removed. In the study, therefore, panels prepared from DH36 steel, commonly used in naval constructions, were selected with different surface preparations to represent different practical cases that may be found on a structure in the shipyard.

As shown in Table 1, one set of steel panels (100 x 175 mm) was grit- and shot-blasted (metallic abrasives) in an automatic facility to grade Sa 2½ (roughness Ra = 7 microns), and then coated with a temporary zinc-rich shop primer (zinc silicate, 10–15 μm) as their initial condition (Type 1 panels). Another set of panels (Type 2) were grit blasted to Sa 2½ with medium grit (Ra = 10–12 microns) and left uncoated as their initial condition. Secondary surface preparation on Types 1 and 2 panels consisted of UHP waterjetting, performed using either a gun or a robot. Table 2 gives details on the UHP waterjetting equipment and configurations used to get a degree of cleanliness, DHP4 according to NF T35-520, and a flash rust level less than OF1 as defined in the same standard. Three different pressures were applied on Type 1 samples (i.e., 2560, 2800, and 3000 bar), both with the gun and the robot. The samples were identified by a system denoting the original state and the subsequent treatment used; for example, the label Sa_R_2560 corresponds to: Sa = blasted surface Sa 2½, R = Robot UHP waterjetting; 2560 = pressure of UHP waterjetting, 2560 bar.

Two further panels were used as additional controls, one grit blasted to Sa 2½, without further treatment (no primer and no secondary surface preparation), and one grit/shot-blasted panel with zinc silicate primer applied, followed by grit blasting to Sa 2½ as secondary surface preparation.

Table 1: Description of Steel Samples and Initial States

	Type 1	Type 2
Type of steel	DH36	
Initial states	Blasted to Sa2½ + Zinc-rich shop primer coated	Blasted to Sa2½ (ISO 8501-1)
Secondary surface preparation	UHP Waterjetting	UHP Waterjetting

Evaluation Procedures

- Surface profile

A stylus instrument was used to determine the surface roughness parameters (Ra). Twenty measurements per sample were made and averaged.

- Scanning Electron Microscopic Examination (SEM)

The surface microstructure of the steel was studied using SEM. The composition of the substrate and, in particular, the amount of zinc from residual zinc shop primer was determined using an Energy Dispersive Spectrometer (EDS) coupled to the SEM. The depth of analysis was about 100 μm, and 3 measurements per samples were made and averaged.

- Mössbauer Spectroscopy

The determination of rust composition was performed using Mössbauer spectroscopy at the Institute of Materials from the Czech Science Academy. Investi-

Table 2: Description of UHP Waterjetting Parameters and Equipments

Parameters	Hand-held Gun	Robot
Degree of cleanliness according to NF T35-520	DHP4	
Level of flash rusting according to NF T35-520	<OF1	
Pressure of cleaning	from 2560 bar to 3000 bar	from 2560 bar to 3000 bar
Water flow	15 liter/min for 2500 bar	28 liter/min for 2500 bar 40 liter/min for 3000 bar
Equipment	"Rotorjet" with 4 nozzles 0.4 mm	Rotating water jet head with 10 nozzles,
Angle of cleaning	75-90 degrees	90 degrees
Conductivity of water	400 μS/cm	400 μS/cm
Distance of jet from surface	50 mm	between 20 and 30 mm

gation of a surface layer to depths up to 300 nm was carried out using Conversion Electron Mössbauer spectroscopy (CEMS). The measurements were performed on an area of 10x10 mm^2.

- Condensation Testing

A condensation chamber was used to study the formation of red rust as a function of exposure time and surface preparation. Intermediate evaluations were performed after 30 minutes and every hour on the first day. The test was conducted at 40 C over 3 days. The extent of red rust was calculated using image analysis software applied to photographs of the samples. This was done on a surface of 6x6 cm^2, excluding edges.

Results

Characterization of Steel Surface Profile

Unlike abrasive blast cleaning, UHP waterjetting does not impart a surface profile to the substrate because no abrasive is in the water stream. However, it is important for the waterjetting to remove contaminants such as dirt and rust as well as old paints.

The influence of water pressure from 2560 to 3000 bar and of the waterjetting tool (hand-held gun and robotic unit) was studied on zinc-rich shop primer-coated steel substrates, and the surface state was evaluated by microscopic inspections using SEM and roughness measurements. No statistically significant differences in the surface state among the UHP-treated panels were observed due to the pressure or the type of UHP tool. However, after UHP waterjetting, the degree of surface roughness obtained was lower than would be achieved with abrasive blasting to Sa 2½. The effect of this lower roughness on coating adhesion needs to be examined.[7]

Figure 1 compares the roughness parameter Ra measured using a stylus instrument as a function of water pressure and waterjetting equipment panel treatment. (Only the robot results are shown for the Type 2 panels.) Typical Ra values of 9 to 12 µm were found for abrasive blasted panels without the zinc primer (Type 2 panels), while a slightly lower roughness (7 to 8 µm) was found after UHP waterjetting was applied on zinc primer-coated steel (Type 1 panels) In Fig. 1, the bars represent the average Ra value, and the lines on each bar represent the range of results.

Surface Steel Composition

SEM/EDS technique has been used to analyze the remaining zinc after UHP waterjetting of zinc shop primer-coated steel and thus evaluate the efficiency of UHP waterjetting in cleaning the steel surface as a function of water pressure and equipment. It should be highlighted that the depth of analysis depends on the technique used, with about 100 µm for SEM/EDS.

Figure 2 demonstrates the influence of UHP waterjetting pressure on the removal of the zinc shop primer. The y-axis represents the ratio Zn/Fe calculated from EDS spectra, and the x-axis indicates the UHP equipment used and the

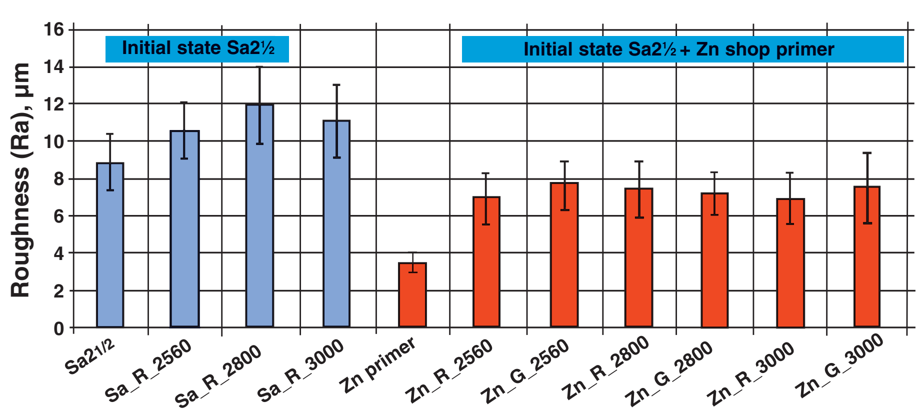


Fig. 1: Influence of UHP waterjetting pressure and tools on the surface roughness (Ra) of grit-blasted steel Sa2½ (Sa) without and with zinc shop primer (Zn). R: Robot, G: gun.

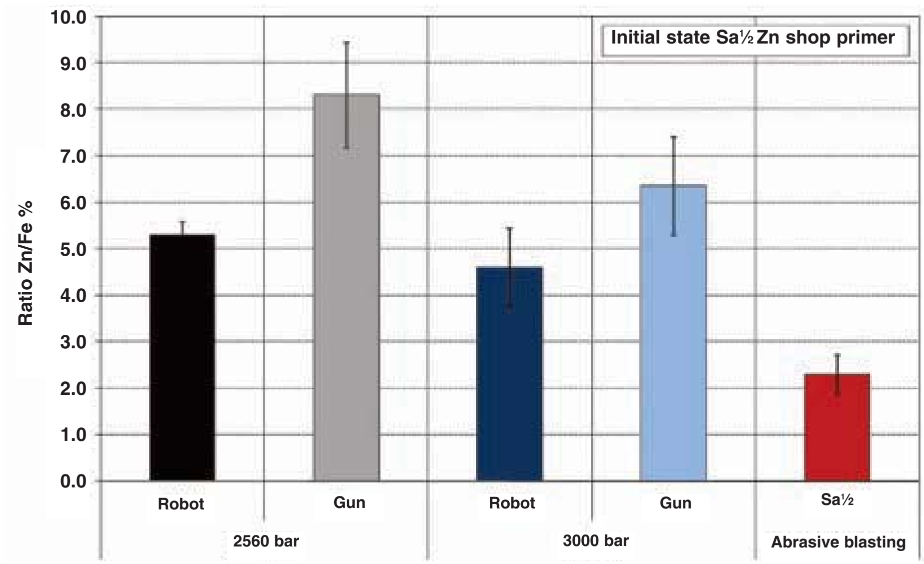


Fig. 2: Influence of UHP waterjetting pressure and tool on the removal of zinc from zinc shop primer coat. Ratio Zn/Fe in weight from SEM/EDS measurements.

pressure. The results clearly indicate that zinc remains on the steel surface regardless of the waterjetting equipment used and regardless of the pressure, between 2560 and 3000 bar. However, a better efficiency in removing zinc was observed for water pressures of 2560 and 3000 bar with the robot compared to the gun. Note that traces of zinc also remain on the steel surface after abrasive blasting, as indicated by the fifth bar in Fig. 2 (which, as a control for this part of the study, was initially automatically abrasive blasted, then coated with the temporary zinc primer, and then abrasive blasted again to remove the primer). SEM/EDS inspection of the abrasive blasted surface showed the presence of dust from abrasives on steel, in contrast to UHP waterjetted surfaces, where no debris was observed on the surface.

Mössbauer spectroscopy analysis was conducted directly on the steel surface to assess the relative amount of iron phases in a surface layer of approximately 300 nm in thickness. The results are presented in Fig. 3 for the 6 different surface states inspected. It can be observed that a large part of iron is present in its metallic form (Fe [α]), in particular for the abrasive blasted surface Sa 2½ only or with a further UHP waterjetting. In addition, the oxide thickness is rather thin on these samples when comparing the one on steel initially covered with a zinc shop primer. On the reference steel Sa 2½, iron oxides are composed of magnetite (0.03) and Fe^{3+} (FeOOH) in equal proportion. No significant influence of UHP waterjetting may be observed on the composition of iron oxides at least between 2560 and 3000 bar. However, it seems that UHP waterjetting applied on abrasive blasted steel favored the formation of Fe^{2+}. The results should, however, be considered with caution because the relative amount is quite low and the surface of analysis is restricted. Although at this stage the composition of the rust is academic, it could be useful for interpreting the results of paint testing in the second part of the study.

For the steel surface initially covered with the zinc-rich shop primer and further cleaned using waterjetting, the thickness of the oxide layer is indeed more important and composed of Fe^{2+}, Fe^{3+}, magnetite, and a mixed oxide type FeX_2O_4 (where X = Si, Zn). There is, however, one exception for the samples waterjetted with the robot at 2560 bar, where the oxide layer is composed purely of magnetite. Further investigations should be made to determine whether the exception is a rogue result. On the other waterjetted surfaces, magnetite represents between 6% and 8%. No significant effect from the waterjetting pressure or tool used was observed.

Nevertheless, one cannot exclude the possibility that the remaining zinc silicate

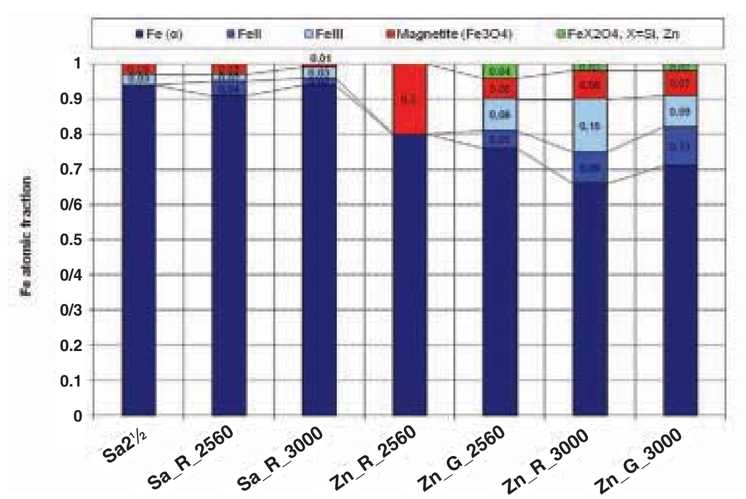


Fig. 3: Distribution of iron phases as a function of UHP waterjetting parameters pressure and tools applied on zinc-rich primer coated steel (Zn) – Comparison with abrasive steel Sa2½ (Sa). R = robot, G = Gun; CEMS Mode (Mössbauer spectroscopy).

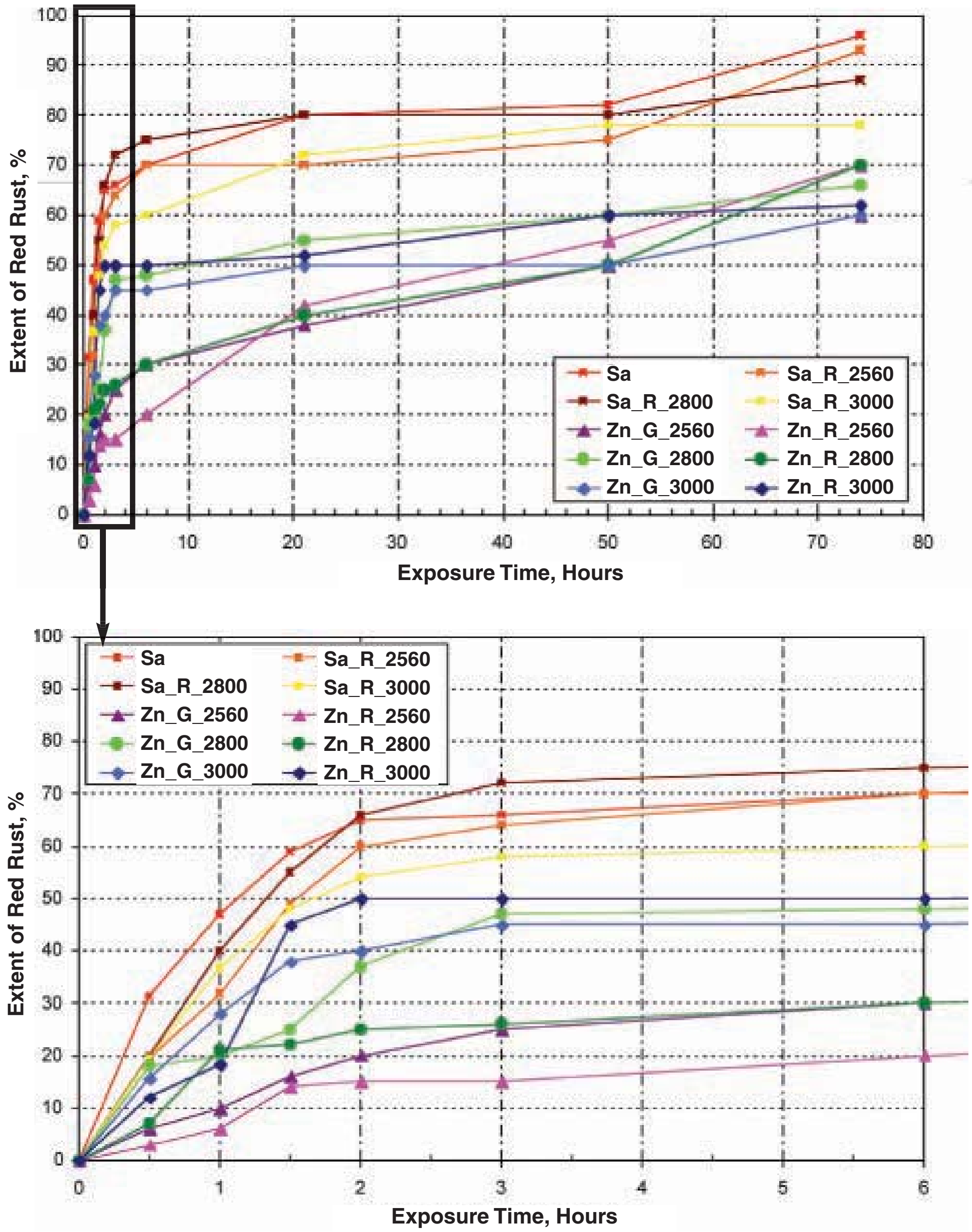


Fig. 4: Extent of red rust on steel panels with different surface preparation as a function of exposure time in condensation test at 40 C. Sa: Initial state : Sa: Sa2½; Zn: zinc shop primer coat; hydroblasting with a robot (R) or a hand held gun (G).

did not influence the measurements.

Results from the Mössbauer spectroscopy did not show any systematic trends in the composition of the oxide film regardless of the waterjetting parameters and tool. Only differences in the oxide thicknesses were observed on the initial state, i.e., the steel surface covered with a zinc-rich primer or blasted steel Sa 2½.

Condensation Test

A condensation test at 40 C was performed on steel samples with the different surface preparations in order to evaluate the rate of rust formation. As described in the experimental section, the influence of waterjetting pressure and equipment was assessed on two initial surface states, Sa 2½ with or without zinc shop primer. On Fig. 4, the evolution of the percentage of red rust is plotted as a function of exposure time in the condensation test. From the results, it may be observed that abrasive blasted steel (Sa 2½) panels further cleaned or not cleaned with UHP waterjetting are more sensitive to red rust formation than similar steel samples initially covered with a zinc shop primer and subsequently cleaned by UHP waterjetting. These results are in agreement with the presence of zinc remaining on the waterjetted steel surface that was initially covered with the zinc shop primer. The presence of a small amount of zinc delayed the formation of red oxidation during the first stage of exposure.

A slight effect of the waterjetting pressure may be observed on abrasive blasted surface after 72 hours of testing, where the extent of red rust increases in the following order: Sa_R_3000 < Sa_R_2800 < Sa_R_2560 < Sa. The extent of red rust was about 80% on steel cleaned at 3000 bar, while rust covered more than 95% of the initial abrasive blasted state.

On surfaces initially covered with a zinc shop primer and further waterjetted, the extent of red rust ranged between 60 and 70% of the surface. A slight influence from the water pressure may be noticed, again in quite good agreement with the amount of remaining zinc (Fig. 2). It is likely that additional exposure in the condensation test would result in full coverage of red rust if the remaining zinc had been completely consumed.

Conclusions

The aims of the study were to characterize the surfaces of abrasive blasted steel (Sa 2½), zinc-rich shop-primed steel surfaces after UHP waterjetting (as in new construction), in terms of surface roughness and cleanliness. The influence of cleaning parameters such as flow pressure between 2560 and 3000 bar for the waterjetting tool, e.g., a hand held gun or

robot, was examined. The results were compared with conventional grit-blasted surfaces as initial states.

From the results, the following conclusions may be drawn.

- No significant effect of the UHP waterjetting tool (hand-held gun or robot) and water pressure between 2560 to 3000 bar on the surface profile was observed. Typical roughness parameters were measured on Sa 2½ steel surface while a slightly lower Ra was found after hydroblasting of zinc-rich shop primer-coated steel panels.
- Whatever the parameters of waterjetting (hand-held gun or robot, water pressure from 2560 and 3000 bar) applied on zinc-rich shop primer-coated steel, traces of zinc and silica were found on the steel surface. The same observation was also found after conventional abrasive blasting. In addition, a mixed oxide type FeX_2O_4 (X= Zn, Si) was detected using Mössbauer spectroscopy, again regardless of the waterjetting parameters selected in the present study. It is, however, not known whether traces of zinc may affect further coating performance.
- As expected, the presence of zinc remaining on waterjetted steel delayed the formation of red oxidation, as observed in a condensation test. About 70% of UHP-treated samples initially covered with a zinc-rich shop primer were rusted while red rust covered 100% of UHP-treated abrasive blasted panels.

References

1. A. Momber, *Hydroblasting & Coating of Steel Structures*, Elsevier, 2003.
2. T. Mabrouki, A. Conier, O. Hafiz, K. Raissi, *Mécanique & Industries*, 5 (2004) 11.
3. P. Le Calvé, P. Meunier P, J.-M. Lacam, *Protective Coatings Europe*, 19 (9) (2002) 22.
4. P. Le Calvé, P. Meunier, J.-M. Lacam, *Journal of Protective Coatings & Linings (JPCL)*, 20 (1) (2003) 48.
5. P. Le Calvé, *JPCL*, (24) no. 8 (August 2007) 13.
6. M. Islam, W. McGaulley, M. Adams *Analitical WJTA American Waterjet Conference*, August 21–25, 2005. Houston, Texas, USA.
7. P. Le Calvé, J-P Pautasso, N Le Bozec, Paper 8371, Eurocorr09, September 6–10, 2009, Nice, France

JPCL

From Alkyds to Polysiloxanes: A Review of Bridge Coatings

By Chris McMillan, International Paint, LLC

Bridge coatings have changed significantly over the years, leading to a wide array of coating types. This article will briefly discuss their evolution, with a focus on topcoats.

Background

As far back as the 19th century, protective coatings have been used on steel bridges. Until the 1960s, bridge coating technology changed little. Typically, lead- or lead-chromium-pigmented paint systems were applied directly to intact mill scale. These systems performed well despite the poor surface preparation because the pigments were strong corrosion inhibitors.

However, industry and the government became aware of the health risks associated with lead pigments. Thus, the industry shifted from coating chemistries with lead to high-performance coating systems, eventually settling on zinc-rich primers with vinyl topcoats.

Ever-tightening volatile organic compound (VOC) regulations eventually forced the vinyl topcoat technology to the side and paved the way for a new high-performance system that used a coat of epoxy to impart excellent anticorrosive properties, followed by a topcoat to protect color and gloss. The most common topcoat is polyurethane, which provides varying degrees of gloss and color retention, depending on the product's formulation.

The three-coat workhorse of bridge coatings, zinc-epoxy-polyurethane, has changed little over the past 15 to 20 years. However, with tightening maintenance and capital expenditure budgets, bridge authorities have been forced to stretch dollars and extend paint life expectancies. To meet the demand for "higher performance" coatings systems, coatings manufacturers have developed and introduced new finish coat technologies into the bridge market.

Editor's Note: This article is based on a paper the author presented at SSPC 2011, the conference of SSPC: Society of Protective Coatings. The original paper is in the Proceedings of SSPC 2011 (www.sspc.org).

Finish Coat Types

While not all-encompassing, the following list captures the majority of traditional finish coats and the newer "higher performance" finish coats: alkyds, acrylics, polyurethanes, fluoropolymers, and polysiloxanes.

Alkyd Technology

Alkyds today are similar to the products used in the 1960s and 70s. Today's are formulated with similar resin technology but do not use lead pigments. They now use less harmful but less effective inhibitive pigments such as zinc phosphates.

Continued

Alkyd finish coat technology is recognized as fairly substandard for ultraviolet light (UV) durability. Very little UV energy is needed to break down the chemical bonding of the alkyd and begin the degradation process. Because of their substandard corrosion and UV resistance, alkyds are typically used where long-term protection and aesthetics are not important.

Acrylic Technology

Acrylic finish coat technologies are often single-component, waterborne products specified widely for bridges. Acrylics typically have good color and gloss retention and are often applied over zinc primers to provide superior corrosion resistance.

Waterborne acrylics have limitations; they dry slowly (or not at all) when temperatures drop below approximately 40 F or where high humidity is present. When used in dry conditions with good airflow, acrylic coatings tend to work well, but because many bridges span waterways, acrylic usage is somewhat limited.

Polyurethane

Polyurethane finish coats have a 50-year track record as protective coatings. The biggest challenge with commercially available standard polyurethane finishes is that they have been engineered to keep costs down. With lower cost comes reduced performance in color and gloss retention. Commercial-grade polyurethanes perform well in the short term but tend to fall off quickly after a certain point.

Premium polyurethane finish coats can be formulated to provide superior UV resistance with excellent color and gloss retention. These premium urethane products are typically for high-end applications. Quite costly, they generally have not been accepted by the bridge market. Another drawback to polyurethane technology is the health risk associated with the use of isocyanate.

Fluoropolymer Technology

Fluoropolymer coatings are formulated with fluorinated monomers combined with carbon-based products, forming a tough, resilient coating. Fluoropolymers have excellent color and gloss retention. However, their gloss and color retention comes at a price. One of the most expensive coating types on the market, fluoropolymers are often cost prohibitive as bridge coatings.

Another drawback to fluoropolymers is that they are typically low-solids, high-VOC coatings. However, lower VOC fluoropolymers have been developed.

Polysiloxanes

Introduced in the mid-1990s, polysiloxane coatings have changed considerably.

Their main resin backbone is a siloxane resin co-polymerized (blended) with an organic resin. The siloxane resin backbone is the key to the coating's UV durability. More energy is required to break the silicone-oxygen chemical bonding than is needed to break the carbon-carbon bonding found in typical organic finish coats (Fig. 1). The more energy is required, the longer the coating is expected to resist UV degradation. The organic resin choice is an important element in determining the final product's performance. The resin influences such properties as color stability, gloss retention, hardness, chemical resistance, and flexibility.

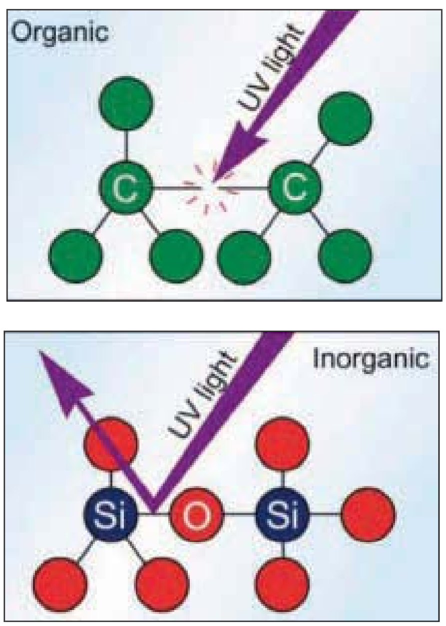


Fig. 1: More energy is required to break the silicone-oxygen chemical bond found in inorganic finish coats than the carbon-carbon bond typical of organic finish coats. Courtesy of the author.

The first polysiloxanes were modified with epoxy resins; while the coatings did exhibit improved UV resistance, they were often brittle, and some failed prematurely. A newer generation of epoxy polysiloxanes and, more importantly, of acrylic-modified polysiloxanes, has been developed. The acrylic polysiloxanes have less internal stress and so are more flexible than earlier formulations. The acrylic polysiloxanes,

Continued

especially in darker colors, have also proved to be more resistant to UV degradation.

Polysiloxane coatings can be formulated well below current national and regional VOC limits, and do not carry the health risks associated with some other systems.

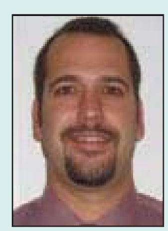
Polysiloxanes are not the right products for every bridge project. They are typically more expensive than commercially available polyurethanes and at times can be cost prohibitive; however, when considering the extended service life and reduced maintenance costs, polysiloxanes can be an excellent fit for bridges. For some projects, the initial cost is outweighed by the improved color stability of dark, deep colors—sometimes a necessity for superstructures exposed to constant sunlight. Polysiloxanes have been used increasingly on bridges over the past few years in several different ways. The most common use is replacing the polyurethane finish in a traditional three-coat zinc-epoxy-finish coat.

A two-coat system—a thick film polysiloxane coating applied directly to an inorganic zinc primer—has reduced time and labor costs in shop coating.

Polysiloxanes have also been used as part of a combination of systems: the bridge underside, which sees less sunlight, is coated with a zinc-epoxy-polyurethane, and the bridge superstructure (e.g., large towers) is coated with the zinc-epoxy-polysiloxane system. This combination of systems helps keep project costs down but provides maximum UV resistance in the areas most directly affected by UV exposure.

Conclusion

Of all the bridge coating technologies currently used, polysiloxane technology is still relatively young. However, even given their relative "youth," polysiloxane coatings have proven to be a step forward in terms of UV durability and finish coat protection. The movement of these products into a cost competitive market such as the bridge market exemplifies how sustainability and life cycle costs are increasingly relevant, and the coatings-specifying community is actively seeking solutions.



Chris McMillan has worked in the coatings industry for 12 years as a formulating chemist, marketing manager, and currently as the Senior Market Manager for International Paint, LLC. He is a member of SSPC and is a NACE Level 3 certified coatings inspector.

Preventing Overspray with a Wind Monitoring Plan

By Julie Dean, Overspray Rx

Overspray is a widespread, costly problem for industrial coating contractors. The typical cost of overspray removal ranges from $250-$1,000 per vehicle (Fig. 1), making it easy for large claims—such as all cars parked near a bridge painting job—to quickly escalate into the tens of thousands of dollars.

The most effective means of reducing overspray are cost prohibitive and labor intensive.

• Applying paint or coating with a roller requires more time and labor than spray painting, increasing costs to the client and jeopardizing competitive contracts.

• Structure containment greatly reduces the possibility of overspray fallout, but the costs of containment can be quite high and can inconvenience the client.

Alternatively, developing a wind monitoring plan is a simple, inexpensive way to identify and reduce overspray fallout claims, cross-contamination of structures, and safety hazards. An effective wind monitoring plan can be developed and implemented in three steps.

1. Identify at-risk areas.
Get to the highest vantage point possible and make note of parking lots and other locations where vehicles might be at risk. Remember that overspray fallout frequently drifts over structures and vegetation to surrounding property. After surveying the area from a distance, do a ground assessment. Walk areas where your view was obstructed and make note of any additional liabilities.

2. Choose your prevention tools.
Three types of effective and economical prevention tools are hand-held weather monitors, windsocks, and targets. These tools allow a crew to accurately monitor the weather conditions on the job site—a critical component of a successful plan.

Fig. 1: Overspray removal from cars can cost contractors thousands of dollars.
Photos courtesy of the author

• A hand-held weather monitor can provide accurate, real-time, recordable readings of ambient conditions, including wind. Several companies manufacture electronic hand-held weather monitoring units. Depending on the brand and model, units can measure wind speed, wind direction, crosswind, air velocity, air temperature, relative humidity, dewpoint, and other weather conditions. The ability to track the wind means that the crew can anticipate potential overspray or safety issues and halt work until the risk has passed. Some monitors can also record and save readings, useful features when mitigating liability issues in overspray fallout claims, coating failures, and safety concerns.

Fig. 2: Windsocks should be placed on high and low spots.

• A windsock is another tool for monitoring environmental site conditions. Wind speed and direction vary greatly at different elevations, so several windsocks are often needed for effective monitoring. Ideally, windsocks should be situated high atop structures as well as on the ground. Windsock locations should be easily viewable from all vantage points (Fig. 2).

• Targets are another low cost tool for monitoring potential overspray problems. A target is any dark colored object placed strategically on the site to "catch" evidence of overspray. For example, dark-colored pails hung on poles or black, spray-painted boxes make effective targets. If you are not sure where the overspray might land and where to place the targets, follow the motto "When in doubt, go check it out."

3. Train your crew.
For any wind monitoring plan to succeed, all crews on the job site must understand how to use wind monitoring tools. Crews also must be familiar with the at-risk locations and know how to identify the signs of a potential issue. It is best to designate one person to be responsible for wind monitoring. The designated person can use a tool as simple as a whistle for a job stop alarm in the event of a hazard. Stopping the job before the hazard causes overspray can save a great deal of money down the road.

Julie Dean is the founder and owner of Overspray Rx, a national provider of overspray removal services as well as overspray prevention tools and training information.

ABIH Renews Certification Credit for SSPC Training Courses

SSPC is pleased to announce that the American Board of Industrial Hygiene (ABIH) has renewed the awarding of certification credits for industrial hygienists who pass the SSPC Lead Paint Removal (C3) and Lead Paint Removal Refresher (C5) training courses.

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Any CIH or Certified Associate Industrial Hygienist (CAIH) who passes these SSPC courses will earn 4.0 Certification Maintenance (CM) points from ABIH. All CIH/CAIHs must take continuing education and training to maintain their certifications. The CM points earned from taking C3 and C5 will now be credited toward maintenance of their certifications.

The ABIH approval follows the milestone establishment of SSPC as an IACET-Approved Training Provider in 2006. By establishing relationships with other certifying and accreditation organizations, SSPC is expanding its footprint in professional continuing education. These relationships are important to the growth of SSPC's training and certification program, as they expose it to new segments of the industrial marketplace.

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

Training Roundup

The following is a summary of recent SSPC training.

SSPC C1 was held in Paso Robles, CA, in February.

• West Coast Industrial Coatings hosted SSPC C1, Fundamentals of Protective Coatings, in Paso Robles, CA, on Feb. 21–25. Seven students attended, and Tony Ippoliti led the course.

• The SSPC C3, Lead Paint Removal, course was held March 8–11 at Industrial Corrosion Control, Inc. in Pascagoula, MS. Mitch Blum was the instructor, and 14 students attended.

• In New Mexico, Comex hosted the SSPC Quality Control Supervisor (QCS) course on Feb. 23–24. Phil Parson instructed 13 students.

• The SSPC NAVSEA Basic Paint

Continued

Students attended SSPC C3 in Pascagoula, MS.

Comex hosted a QCS course in New Mexico.


The NBPI Course had 11 students in San Diego.


Students of the BCI program in Florida.

Inspector (NBPI) course was held Feb. 28 to March 4 in San Diego. The course was hosted by the Southwest Regional Maintenance Center (SWRMC), and 11 students participated. The instructors were Gordon Kuljian and Johnny Sanchez.

• SSPC's Bridge Coating Inspector (BCI) program was held in Clearwater, FL, on March 21–26. Poseidon Construction hosted the program, which had 17 students. Greg Richards and Kevin Schweikhart were the instructors.

Demi Tiliakos of Poseidon Construction said, "I enjoyed working with Jennifer Merck and Dee Boyle in putting this class together. It gave me a better perspective on the inner workings of SSPC and gives me the confidence that my employees have the training and knowledge required to do the most proficient job for our company."

• Surface Technologies hosted SSPC Abrasive Blasting (C7) on March 25 and Water Jetting (C13) on March 25–27 in San Diego. Each course had 12 students, and the instructor for both courses was Terry New.

Larry Lilliard of Surface Technologies said, "The training experience was everything we hoped for and more. Terry was as good an instructor as we remembered, and all of our employees who were in the training and certification process had nothing but good comments about the whole weekend."

• On Feb. 21 to March 4, SSPC held its Protective Coatings Inspector (PCI) course in Singapore. The instructors were Muniandi Dewadas and Abdul (Bani) Quim, and 18 students attended.

• SSPC held its Lead Removal Refresher

Students of the PCI course in Singapore.

(C5) course in Pascagoula, MS, on March 7. Mitch Blum instructed the class of 16 students. Industrial Corrosion Control, Inc. hosted the course.

SSPC held its C5 course in Mississippi.

• LINE-X Protective Coatings held the SSPC C1/C2 Modified Class in Phoenix, AZ, on March 28 to April 1. There were 15 students, and the instructor was Joe Davis.

Students took the C1/C2 Modified Class in Arizona.

Japan Chapter Disaster Relief Campaign

The SSPC Board of Governors recently announced the SSPC Japan Chapter Disaster Relief Campaign aimed at helping the Japan Chapter support relief efforts for the earthquake and tsunami-affected areas of Japan.

The Board has agreed that SSPC will match contributions from SSPC members, up to $5,000. Contributions in excess of $5,000 will be sent directly to the Japan Chapter. Donations are tax deductible in the U.S.

Members who contribute will have their names on the SSPC website, unless they wish to remain anonymous.

There are two easy ways to donate:

• Donate online via the SSPC MarketPlace

See Executive Director Bill Shoup's editorial on p. 4 of this issue for instructions on how to donate online.

• Send a check or money order to:

SSPC Japan Relief Campaign, c/o SSPC, 40 24th Street, 6th Floor, Pittsburgh, PA 15222-4656

The donation form can be downloaded at www.sspc.org. Checks should be made payable to "SSPC" in U.S. funds only. Note "SSPC Japan Relief Fund" as a memo.

Webinar Education Series

Kogler to Present Free SSPC/*JPCL* Webinar on Protecting Steel Edges

Prominent coating specialist Bob Kogler will present an SSPC/*JPCL* Education Series Webinar entitled ***"Protecting Steel Edges"*** on June 8 from 11:00 a.m.–Noon, EST.

The free webinar, to be presented at a basic level, will describe how to make sure steel edges and other irregular surfaces get enough paint on them to prevent early corrosion.

Also discussed will be addressing edge protection in project specifications.

Free registration for the webinar is available online at www.paintsquare.com/education.

Bob Kogler, a principal with Rampart LLC, was formerly the head of corrosion protection and coatings research at the Federal Highway Administration. He is also Past President of SSPC.

Date:
June 8, 11:00 a.m.-Noon, EST

Register at
paintsquare.com/education

International Bridge Conference Planned for Pittsburgh

Photo courtesy of Gateway Clipper and VisitPittsburgh.

The 28th Annual International Bridge Conference (IBC), presented by the Engineers' Society of Western Pennsylvania, will take place June 5-8 at the David L. Lawrence Convention Center in Pittsburgh, PA.

The Keynote Session will be held during the morning of Monday, June 6, and the Featured Country and Proprietary Sessions will take place in the afternoon. Bridge industry leaders from around the world will speak. The 2011 Featured Country is South Korea.

The conference will include four concurrent technical sessions, with new presentations scheduled every 25 minutes; seminars in 4-, 8-, and 16-hour intensive, in-depth continuing education courses; and several workshops, usually 4 or more hours in length, presented by co-sponsors, partners, and other leading industry groups.

SSPC will serve as an official sponsor for the Coatings Workshop on June 7. The following is information known to *JPCL*, as of press time, about SSPC's Coatings Workshop.

- From 8–8:30 a.m., Kurt Best, Bayer, will present, "Time is Money: Improving Shop and Field Painting Throughout by Reducing Finish Coat Handling Time."

The presenter will discuss a study that compared the handling time of three generic types of high performance finish coats cured under normal and cold/damp conditions, applied as two- and three-coat systems, using traditional standardized test procedures and novel testing procedures designed to simulate actual handling and environmental conditions in the shop or field.

- From 8:30–9:30 a.m., Clint Ramberg, Spider, will present, "Suspended Scaffold Access in Power Plants, Bridges, and Offshore."

The presentation will focus on how suspended scaffolding can be used to provide access to bridges for inspection, maintenance, and repair operations. Photos and case studies from Spider projects will be displayed. The presenter will discuss proper planning, platform configuration options, and worker safety considerations.

- From 9:30–10:00 a.m., Pradeep Kodumuri, SES Group, will present, "Performance Evaluation of One-Coat

Systems on New Steel Bridges."

The presenter will discuss information on the final results of a study completed by FHWA. In an effort to address cost issues associated with shop application of conventional three-coat systems, the study was completed to investigate the performance of eight one-coat systems and two control coatings for corrosion protection of highway bridges. Two controls were selected: a two-coat system and a three-coat system. The performance of all systems was evaluated under accelerated lab exposure conditions for 6,840 hours; natural weathering exposure in an outdoor environment for 18 months; and at a marine exposure site for 24 months.

• From 10–11:00 a.m., Aimee Beggs and Heather Stiner, SSPC, will present, "An In Depth Look at Standards Most Frequently Used by Industrial Painters."

The presentation will explore all of the standards used by industrial painters, including a review of the basics and a focus on the more obscure requirements and ambiguities. The presentation will also address what constitutes an industry standard, the contractual implications of specifying using only a standard, and the impact of secondary and tertiary references in standards.

• From 11–11:30 a.m., David Simkins, Polygon, will present, "Span PI-2 Climate Control Program—Holding a 210-foot Span of a Highway at 60 Degrees While Pier Concrete is Completed."

The presenter will discuss the material-related challenges involved in concrete curing during a construction project for the new Pearl Harbor Memorial Bridge in New Haven, CT. Scheduled for completion by 2016, the bridge is a 10-lane bridge that will be one of the first extradosed cable stayed bridges constructed in the U.S. This is a hybrid design, combining a concrete cable stressed girder bridge with a cable stayed bridge. Tight specifications for concrete curing require temporary climate control.

• From 11:30 a.m.–Noon, Bill Corbett, KTA-Tator, Inc., will present, "Slip Coefficient and Tension Creep Testing Protocol for Coatings Used in Bolted Connections."

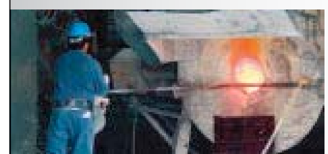
The presentation will describe the process associated with testing and certifying coatings targeted for use in slip-critical connections, such as panel fabrication; surface preparation; coating application; selection of mating surfaces; testing for resistance to slip and tensioned creep; and data reporting including A, B, and C classifications. Appendix A of the Specification for Structural Steel Joints Using ASTM A325 or A490 Bolts, published by the Research Council on Structural Connections, describes the testing methods to determine the slip coefficient of coatings used in bolted connections.

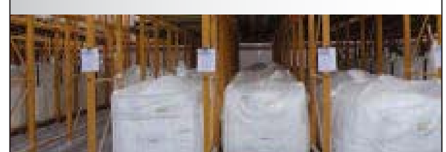
For more information, visit www.internationalbridgeconference.org.

Exhibitors

The following is a list of exhibitors and their booth numbers, as of press time, that are of interest to professionals in industrial and maintenance coatings.

- Chase Construction Products . . .530
- ChemCo Systems 612
- Corrpro Companies, Inc. 827
- DeAngelo Brothers Inc. 831
- The Euclid Chemical Company . .803
- Greenman-Pedersen, Inc./Instrument Sales, Inc. a GPI Company 746
- HRV Conformance Verification Associates, Inc. 733
- Rampart Hydro Services 742
- Safway Services, LLC 743
- SIKA Corporation 700
- Termarust Technologies 601
- Thomas Industrial Coatings 433
- Transpo Industries, Inc. 508
- Vector Corrosion Technologies . .639





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- The SSPC NAVSEA Basic Paint

Continued

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AWWA Brings Water Conference to D.C.

The American Water Works Association (AWWA) will host its Annual Conference and Exhibition, ACE11, in Washington, D.C., at the Walter E. Washington Convention Center on June 12–16.

The conference will include workshops, technical programs, and exhibit hall education sessions. AWWA expects over 500 exhibitors for the exposition. There are also several special events planned, including networking events, young professional events, and keynotes and forums.

Courtesy of Destination DC and Photographer Jake McGuire

On Tuesday "Fundamentals & Control of Internal Corrosion in Drinking Water Distribution Systems" (TUE31), moderated by Vanessa Speight of Latis Associates, offers presentations such as the following.

- "How Did We Get Here: A National Utility Case-Study Review of Recent Internal Corrosion Issues," presented by Richard Giani, DC Water, 2:00 p.m.
- "Overview of Internal Corrosion and Metals Release," presented by Abigail Cantor, Process Research Solutions LLC, 2:30 p.m.
- "Monitoring and Assessment of Internal Corrosion," presented by Christopher Hill, ARCADIS, 3:00 p.m.
- "Developing a Corrosion Control Monitoring Program," presented by Richard Giani, DC Water, 3:30 p.m.
- "Corrosion Control Program Implementation," presented by Patricia Gamby, Washington Aqueduct, 4:00 p.m.

- "Galvanic Corrosion and Other New Areas of Focus in Corrosion Research," Steve Reiber, HDR Engineering, Inc.

At the Exhibit Hall Education Sessions on Tuesday and Wednesday, participants can earn CEUs for attending presentations about instruments, analysis, system assessment, and protection. Two presentations about pipeline protection will take place on Wednesday, June 15. They are on polyethylene encasements for corrosion protection and bar-wrapped pipe.

The annual Water Industry Luncheon will take place on Tuesday, June 14, from 11:30 a.m. to 2:00 p.m. This year's speaker is visionary environmental business leader and advocate Robert F. Kennedy, Jr.

A free seminar is planned for Monday, June 13, from 2–3:00 p.m. It is called "U.S. Government Export Programs: Helping Your Company Join the Global Marketplace." Featured speakers will include several high-level, U.S. and foreign government trade experts.

In addition to the annual luncheon, several other special events are planned during the conference and exposition. The events include a career fair, the Annual President's Reception, First Time Attendee/New Member Program, Young Professional Meet and Greet, and more.

For more information, visit www.awwa.org/ace11.

Exhibitors

The following is a list of exhibitors and their booth numbers, known to *JPCL*, as of press time, that might be of interest to the industrial coatings industry.

- 3M Corrosion Protection Dept.....549
- Atlas Copco 542
- C.I.M. Industries Inc.........................2606
- Carboline 401
- Corrpro Companies, Inc. 2307
- Denso 2602
- Devoe Coatings 507
- Farwest Corrosion Control 1415
- Georg Fischer Central Plastics LLC 1011
- Induron Protective Coatings.......1817
- ITW Devcon Futura Coatings..966
- NACE International 643
- Pittsburg Tank & Tower Co. 1504
- PPG Protective & Marine Coatings..2462
- Radiodetection Corporation........2449
- Raven Lining Systems...................1563
- The Sherwin-Williams Company 1444
- Tank Industry Consultants 2504
- Tnemec Company 2301
- Trenton Corporation 2447
- US Silica Co. 2165
- Utility Service Co., Inc. 2453

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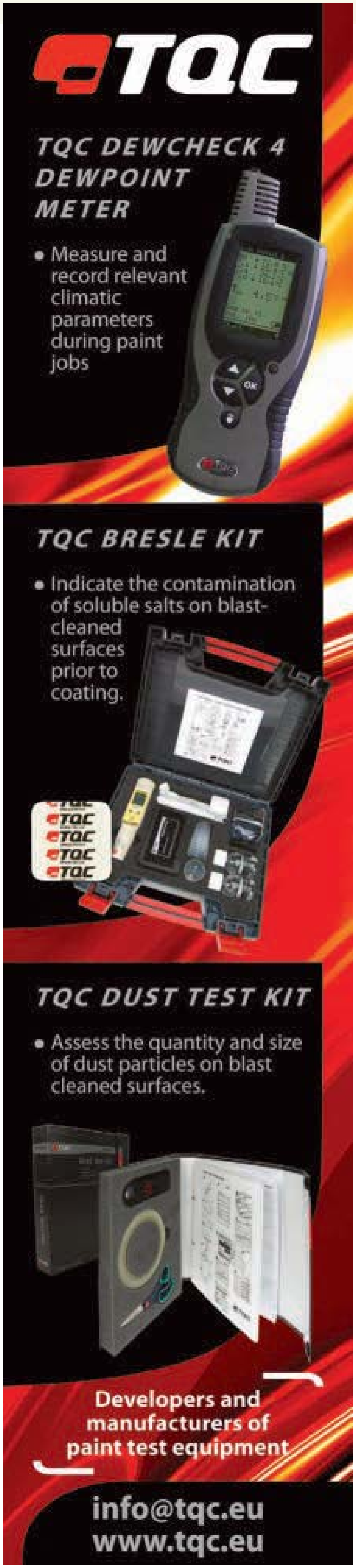


Mega Rust 2011 Planned for Norfolk

The American Society of Naval Engineers (ASNE) will present the annual Mega Rust 2011: U.S. Navy Corrosion Conference on June 6–9 in Norfolk, VA, at the Ted Constant Convention Center. The conference brings together government, military, owners, operators, shipyards, research facilities, and coatings manufacturers and suppliers.

Mega Rust is cosponsored by NAVSEA and the U.S. Fleet Forces Command. The conference provides a consolidated focus on Navy corrosion issues, which are a major factor in the readiness and total ownership cost of naval systems. The conference also gives updates on programs, policies, standards, and Fleet experience.

SSPC will hold the following training programs in conjunction with Mega Rust.

- June 4–8, 8:00 a.m. to 5:00 p.m., NAVSEA Basic Paint Inspector (NBPI)
- June 6, 8:00 a.m. to 5:00 p.m., Navigating Standard Item 009-32
- June 7, 8:00 a.m. to noon, Using SSPC-PA 2 Effectively
- June 8–9, 8:00 a.m. to 5:00 p.m., Quality Control Supervisor (QCS)

Technical Program

Concurrent technical programs start on Wednesday, June 8.

Michael Damiano, SSPC, will present "Current SSPC Program Status," during the June 9 technical session, "Session 4: Program Updates," which runs from 10:35 a.m. to 12:40 p.m. He will update participants on:

- SSPC initiatives in training and certification for coatings contractor employees, including QC inspectors and the workforce performing surface preparation/coatings application;
- new elements in the revised SSPC-QP 1 standard to expand scope and training requirements;
- standards offering lower-cost options for surface preparation for structures with planned limited service life or mild environments;
- the status of revised waterjetting standards; and
- the status of a standard for wet abrasive blast cleaning

The following presentations may be of interest to the industrial coatings industry. More information can be found on the Mega Rust 2011 web site, www.navalengineers.org/events.

- **June 8, 1:45 p.m. to 3:25 p.m.** Session 1: Program Updates includes "A Rapid and Cost-Effective Method for Performing Topside Coatings Assessments on U.S. Navy Ship," by Bruce Nelson, Battenkill Technologies, Inc.; and "Rotating-Arm Coefficient of Friction (CoF) Meter (μ-Deck) Status Update," by Damien Ranero, NSWC Carderock.
- **June 8, 1:45 p.m. to 3:25 p.m.** Session 2: Materials includes "Superhydrophobic Coatings Multiply Corrosion Protections," by Andrew Jones, Ross NanoTechnology LLP; "Innovative Coating Options for Topsides and Underwater Hull of Navy Vessels to Reduce Operational Costs and Improve Environmental Footprint," by John Mangano, International Paint, LLC; and "Advanced 2K and 1K Topside Coatings for the U.S. Navy," by Erick Iezzi, SAIC.
- **June 8, 1:45 p.m. to 3:25 p.m.** Session 3: Analysis & Inspection includes "Data Analysis of Corrosion Damage on Ship Tanks and Voids," by Patrick Cassidy, Elzly Technology Corporation; "Integrated Testing Protocol for Determination and

Prediction of Corrosion Inhibition and Material Longevity," by Dawn Wellman, Pacific Northwest National Laboratory; "Expert Structures and Coating Analysis (ESCAT)," by C. Thomas Savell, GCAS Incorporated; and "Prediction/Assessment: Non-Disruptive Pipe Condition Assessment Methods Overview and Case Studies," by Yaofu Zhang, Russell Corrosion Consultants, Inc.

• **June 9, 8:00 a.m. to 10:05 a.m.** Session 1: Coating and Corrosion Control includes "Dry Ice Blasting Process for Cleaning, Preservation, Preparation, and Coating Inspection," by Karen L. Bruer, Amee Bay; "Evaluation of 'Spot and Sweep' Blasting as a Cost-Effective Method of Underwater and Outer Hull Surface Preparation for the U.S. Navy," by Stephen Cogswell, BAE Systems Southeast Shipyards; "Abrasive Blasting Protective Equipment and Process Evaluation: Preliminary Findings and Guidance for Control Measures," by Mark Geiger, OPNAV Safety Liaison Officer; "Power Hand Tool and Process Management to Reduce Hand-Arm Vibration Disease Associated with Corrosion Control Operations," by Mark Geiger, OPNAV Safety Liaison Officer; and "Ship Corrosion Control Tool Program," by Dave Zilber, 3M Government Markets.

• **June 9, 8:00 a.m. to 10:05 a.m.** Session 2: Management includes "Software Design Tool Predicts Galvanic Corrosion Rates on Complex Assemblies of Mixed Materials," by Dr. Alan Rose, Elsyca, Inc.; "How the Corrosion Control Knowledge Sharing Network (KSN) is Streamlining Corrosion Control Management Across the Surface Fleet," by Joe Welsh, McKean Defense Group; "Easy Inspection Form Creation for Dry Film Thickness and Related Test Measurement Requirements," by Paul Lomax, Fischer Technology, Inc.; and "Corrosion Control and Holistic Ship Management: A Commercial Operator's Perspective," by Capt. Gordan E. Van Hook, USN (Ret.), Maersk Line, Limited.

• **June 9, 8:00 a.m. to 10:05 a.m.** Session 3: New Technology/Inspection includes "Multisensory Distributed Sensor Network for Intelligent Coating Health Monitoring," by J. Agrawal, ScienceTomorrow; and "A Rapid and Cost-Effective Method for Performing Topside Coatings Assessments on U.S. Navy Ships," by James Tagert, Vision Point System, Incorporated.

• **June 9, 10:35 a.m. to 12:40 p.m.** Session 4: Program Updates includes "Time & Cost Savings Associated with the Application of MIL-PRF-24635 Type V Polysiloxane to the Freeboard and Topside of the U.S.S. BonHomme Richard (LHD-6)," by Mark Schultz, Sherwin-Williams; "Military & Industrial Paint Cartridge Systems—Reduction of Total Ownership Costs," by Markus Scheuber, Sulzer Mixpac USA Inc.; "Current SSPC Program Status," by Michael Damiano, SSPC; "Peel & Stick Nonskid Program Update," by Dave Zilber, 3M Government Markets; and "Impact of Surface Profile on Thermal Spray Adhesion," by James Martin, Naval Research Laboratory.

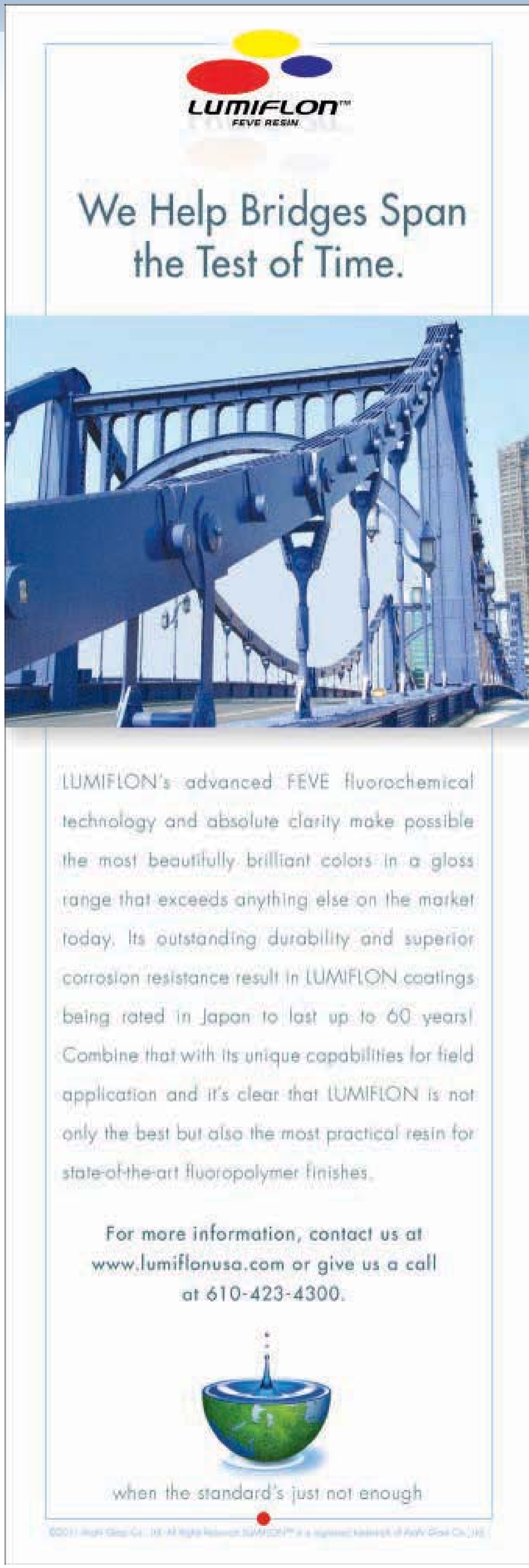
• **June 9, 10:35 a.m. to 12:40 p.m.** Session 5: Studies/Materials/Inspection includes "Direct-to-Metal and Exterior Durable Siloxane Non-Skid Coatings," by Erick Iezzi, SAIC; "Accelerated Life Testing and Cathodic Delamination/Debonding: Improving the Navy's Predictive Capabilities for Corrosion-Induced Metal-Polymer Adhesion Failures," by Dr. Thomas S. Ramotowski, NUWC Newport; "Advances in Laser Coatings Removal for Shipbuilding and Repair," by Erik Oller, Concurrent Technologies Corporation; and "Real-time 4D Non-invasive Subsurface Corrosion Inspection Using Ultra-High Speed, Fourier-domain Optical Coherence Tomography (OCT)," by Dr. Abner Rodriguez, NSWC-CD Philadelphia.

• **June 9, 10:35 a.m. to 12:40 p.m.** Session 6: Training/Management/Inspection includes "Corrosion Assessment Training Available to Navy Personnel," by Mike Moss, NACE International; "Training—A Preventive Maintenance Tool to Control and Prevent Corrosion, Increase Material Readiness, and Reduce Total Ownership Cost," by Kevin Kennedy, AMSEC LLC; "Best Practices of NSCWD-SSES Shipboard Corrosion Assessments," by Ryan Buchs, Vision Point Systems; "Real-Time Demonstration of MFOM Tools in Support of Corrosion Issues," by Dale Hirschman, Fleet Forces Command; and "Understanding the Navy Fade—Color and Gloss Stability," by James Martin, Naval Research Laboratory.

Exhibitors

The following is a list of exhibitors and their booth numbers, as of press time, that might be of interest to the industrial coatings industry.

- Acotec, Inc. 25
- A&E Anti-Corrosion Systems LLC 32
- Ceram-Kote Coatings Inc. 20
- DeFelsko Corporation 13
- Dehumidification Technologies, LP 73
- DESCO Manufacturing Co., Inc. 70
- Eagle Industries. 21
- Fischer Technology, Inc. 7
- Industrial Vacuum Equipment Corporation 53
- International Paint LLC 24
- ITW Polymers Technology. 23
- Marine Coatings LLC 65
- Monoarflex by Siplast . . . . N/A
- NACE International 69
- NCP Coatings Inc. 27
- Norton Sandblasting Equipment . . 9
- Novetas Solutions, LLC 62
- Opta Minerals Inc. 66
- PPG Protective & Marine Coatings 5
- SAFE Systems, Inc. 52
- Schmidt/Axxiom Manufacturing, Inc. 35
- The Sherwin-Williams Company 11
- Specialty Polymer Coatings Inc. 54
- Sponge-Jet, Inc. 1
- SSPC: The Society for Protective Coatings 59
- STAR4Defense 18/19
- Sulzer Mixpac USA, Inc. 6
- Thermion Inc. 15
- Warren Environmental, Inc. 71
- Western Technology Inc. 16



associations

ASTM Has New Standard for Corrosion Protection Systems

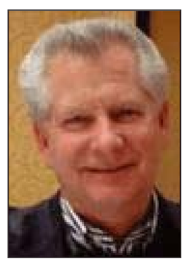
ASTM International standard ASTM A1068, Practice for Life-Cycle Analysis of Corrosion Protection Systems on Iron and Steel Products, has been developed by Subcommittee A05.13 on Structural Shapes and Hardware Specifications, part of ASTM Committee A05 on Metallic-Coated Iron and Steel Products.

According to ASTM, owners and specifiers of steel building projects will be the primary users of the new standard.

For more information or to purchase the standard, visit www.astm.org.

PDA Names New Executive Director

The Polyurea Development Association (PDA) has selected industrial coatings veteran Lou Frank to serve as its new executive director.



Lou Frank

Effective immediately, the appointment was announced at the PDA Annual Conference, which was held in New Orleans on April 13–15. PDA is an international trade association that promotes the awareness and education of polyurea technologies and their uses.

Frank holds a business degree from the University of Maryland and launched both *CoatingsPro* and *SprayFoam* magazines.

regulations

EPA Targets Coating, Foam Compounds

The U.S. Environmental Protection Agency (EPA) has issued action plans to address the potential health risks of two chemicals used in making polyurethane polymers, adhesives, sealants, and coatings.

The plans target methylene diphenyl diisocyanate (MDI), toluene diisocyanate (TDI), and related compounds. Both plans focus on potential health effects resulting from exposures to products containing uncured (unreacted) diisocyanates. The plans identify a range of actions the agency is considering under the authority of the Toxic Substances Control Act.

Diisocyanates are used to make polyurethane polymers.

While most polyurethane products are fully reacted (cured) and are not of concern, adhesives, coatings, spray foams, and other products continue to react while in use and may contain uncured diisocyanates to which people may be exposed, according to the EPA.

Diisocyanates are known to cause severe skin and breathing responses in workers who have been repeatedly exposed to them. The chemicals have been documented as a leading cause of work-related asthma, and in severe cases, fatal reactions have occurred, according to EPA.

Possible actions to address concerns associated with TDI, MDI, and related compounds include:

- Issuing rules to gather data on significant adverse effects;
- Obtaining unpublished health and safety data from industry sources;
- Requiring exposure monitoring studies for consumer products; and
- Banning or restricting consumer products containing uncured MDI or TDI.

companies

Corrpro Promotes New President

Insituform Technologies Inc. has announced that David H. Kroon has been promoted to president of Corrpro Companies, a subsidiary of Insituform.

Kroon will be responsible for global operations and will direct plans to grow business in the Middle East. He will continue to oversee corporate engineering, pipeline, international projects, and engineering and manufacturing groups.

Kroon has a degree in chemistry from Yale University, has been published in several industry journals, is a registered professional engineer in 11 states, and is a member of NACE.

BASF Names VP of Dispersions & Pigments

BASF (Florham Park, NJ) has appointed Derek Fairclough as senior vice president, Dispersions & Pigments, in North America. He is based in Charlotte, NC.

The Dispersions & Pigments business provides resins, binders, pigments, specialty additives, and more for a variety of markets.

Fairclough joined BASF in 2009. He holds a BS (Honors) First Class in applied chemistry from the University of Strathclyde (Glasgow, Scotland).

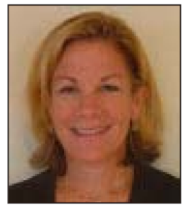
Hi-Temp Names Two Sales Managers

Hi-Temp Coating Technology has named Dean Habegger and Stan Osborne as the new regional sales managers, covering the western and northwestern states.

Continued

Habegger has over 38 years of experience in the protective coatings industry. Osborne has 35 years of experience in the industry and is a member of SSPC and NACE.

Rapid Prep Announces Personnel Change



Nancy Donahue Pescinski

Rapid Prep, LLC announced that Nancy Donahue Pescinski will change her role in the company to focus specifically on business development and expanding the company's presence throughout the U.S.

Pescinski has been with the company since its inception in September 2006. Michael Hogue and Chris McNamara will assume all the executive management responsibilities, effective April 15.

Spider Hires District Sales Rep

Joe McCoy

Spider, a division of SafeWorks, LLC, recently hired Joe McCoy as district sales representative for its New Orleans, LA, location.

McCoy is responsible for assisting contractors and facility owners in energy, oil and gas, infrastructure, O&M, and construction end markets in the Louisiana/Mississippi territory.

New Executive VP at U.S. Zinc

U.S. Zinc announced that Tracy Baugh has been hired as executive vice president, commercial, with responsibility for global commercial, marketing, and sales.

Baugh will be based in Houston, where the company is headquartered.

He most recently worked in a global position in specialized polymer materials.

Hempel to Put Facility in Russia

Hempel Group and the Ulyanovsk authorities have signed an investment agreement to put a Hempel plant in Russia.

Scheduled to start production in December 2012, the plant will feature environmentally-friendly coating production equipment technology. It will house raw materials and finished products, and the company says it will bring approximately 120 new jobs to the region. Hempel is headquartered in Kgs. Lynby, Denmark.

products

PPG Launches New Coatings at Chinese Expo

PPG Industries launched AUE-5000, a wind turbine blade polyurethane topcoat; SIGMAFAST™ 278 primer; and SIGMADUR™ 5687 topcoat, both protective coatings, at the 5th China (Shanghai) International Wind Energy Exhibition in April.

The AUE-5000 topcoat is highly erosion-resistant and offers good adhesion, flexibility, smoothness, impact resistance, and weatherability, the company says. The protective primer, SIGMAFAST 278, can be applied to the exterior or interior of wind towers, the exterior turbine generator and gearbox, and other steel surfaces. According to the company, it offers good adhesion and quick curing speed. The SIGMADUR 568 topcoat meets VOC regulations and can be applied directly to treat steel surfaces in a low-corrosion environment without requiring an anti-rust primer, the company says.

For more information, visit www.ppgwind.com.

New Waterjet Boasts Faster Surface Prep

NLB Corp. (Wixom, MI) has announced its VertaJet™ SRT-6LT, a new handheld waterjet unit that the company says does surface preparation faster than manual waterjetting.

The unit, weighing 20 pounds, does not need an air connection to rotate its 40,000 psi waterjet in a six-inch cleaning path. It removes paint, epoxies, and other coatings from steel and other surfaces, the company says. The unit uses no abrasive and has vacuum recovery to contain water and debris.

For more information, visit www.nlbcorp.com.

New Thickness Gage is Faster

DeFelsko Corporation (Ogdensburg, NY) announced the new PosiTector® 6000, a rugged coating thickness gage with features designed to make it smarter and faster than previous models.

Both standard and advanced models feature built-in memory, onscreen statistics, USB mass storage, and the new Fast mode, the company says. Advance models also include a hi-contrast, reversible color LCD; scan mode; onscreen help; real-time graphing; and picture prompting. According to the company, existing PosiTector probes made after 2006 can be used with the new model.

For more information, visit www.defelsko.com.

Vimas and Hercules Join Forces to Recoat Platt Bridge

The Pennsylvania Department of Transportation has awarded a contract of $42,776,325.41 to the joint venture of Vimas Painting Company Inc. (Campbell, OH) and Hercules Painting Company Inc. (New Castle, PA) to rehabilitate Philadelphia's George C. Platt Bridge. Both companies are SSPC-QP 1- and QP 2-certified. The Platt Bridge, 8,780 feet long and 47.9 feet wide, is a cantilevered through truss bridge with a 680-foot-long main span over the Schuylkill River. The bridge was constructed in 1949 and was last rehabilitated in 1984.

The project involves coatings application, various steel and concrete repairs, and deck rehabilitation. The steel will be abrasive blast-cleaned to a Near-White condition (SSPC-SP 10) and recoated with a three-coat, organic zinc-epoxy-urethane system. The contract includes erecting containment (SSPC-Guide 6) to capture the existing lead-bearing coatings. The project also includes applying a penetrating sealant to 4,024 square yards of reinforced concrete superstructure surfaces and an epoxy-based surface treatment on 4,800 square yards of decking.

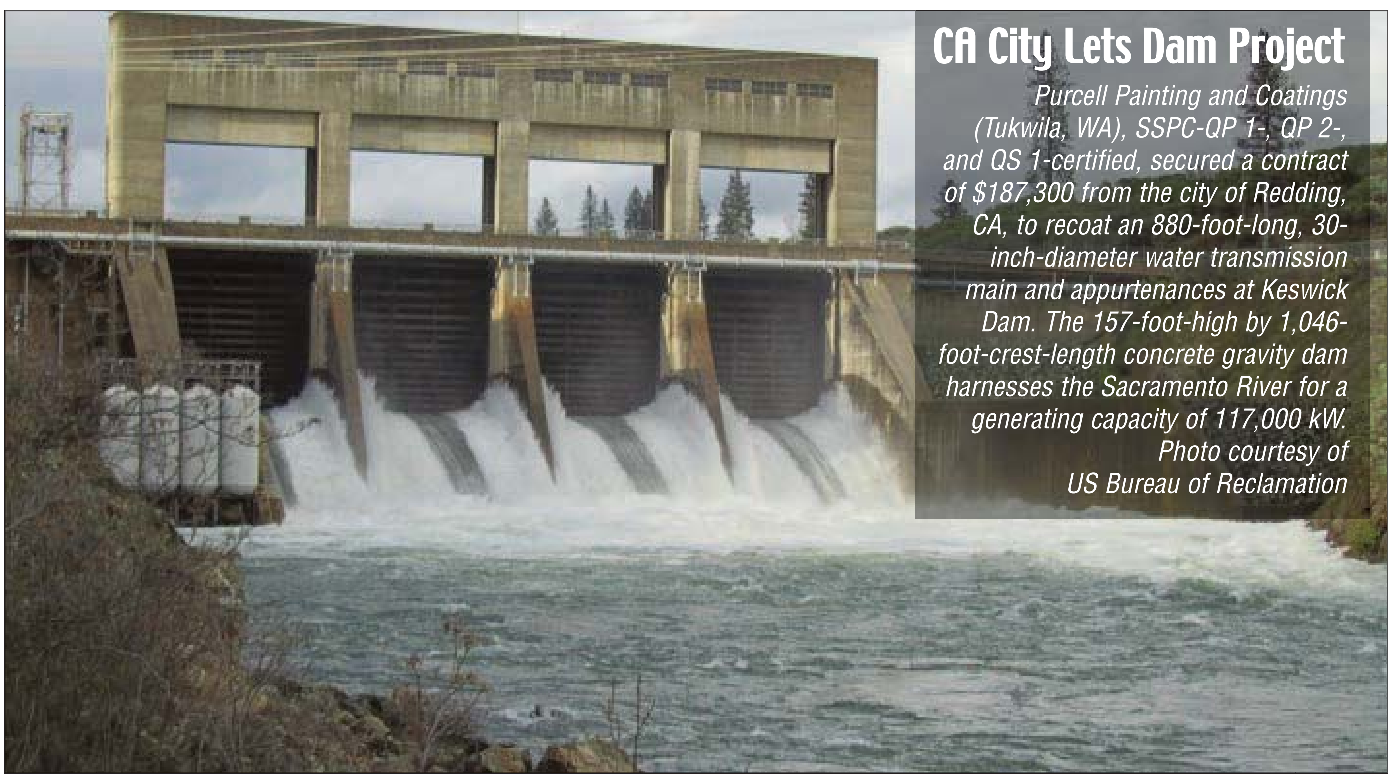
Photo courtesy of Hercules Painting

The project is expected to begin this month and be completed in July 2013.

North Star to Recoat Green River Bridge

North Star Painting Company, Inc. (Youngstown, OH), SSPC-QP 1- and QP 2-certified, won a contract of $1,361,200 from the Kentucky Transportation Cabinet to recoat a 10-span, 1,472-foot-long steel girder bridge that carries US 231 over the Green River in Aberdeen. The steel will be

Continued

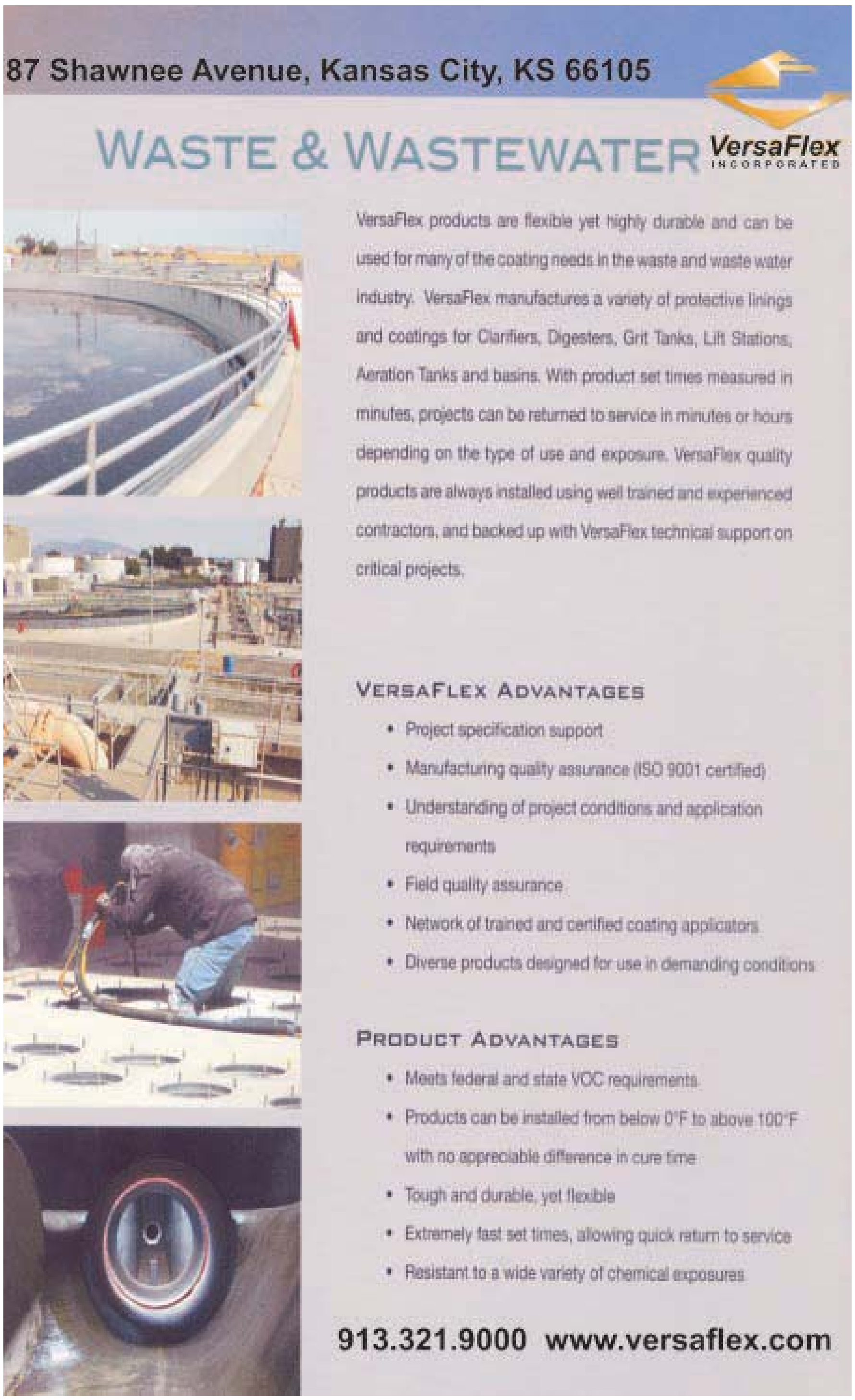


CA City Lets Dam Project

Purcell Painting and Coatings (Tukwila, WA), SSPC-QP 1-, QP 2-, and QS 1-certified, secured a contract of $187,300 from the city of Redding, CA, to recoat an 880-foot-long, 30-inch-diameter water transmission main and appurtenances at Keswick Dam. The 157-foot-high by 1,046-foot-crest-length concrete gravity dam harnesses the Sacramento River for a generating capacity of 117,000 kW. Photo courtesy of US Bureau of Reclamation abrasive blast-cleaned to a Near-White finish (SSPC-SP 10) and recoated with a three-coat, urethane-based, organic zinc-rich system. The contract requires a Class 2A containment structure (SSPC-Guide 6) because the existing coatings are presumed to contain lead. The contractor must provide an SSPC C-3 competent person to oversee waste handling as part of the quality control plan; the Transportation Cabinet will furnish a third-party inspector for quality assurance purposes.

MC Sandblasting and Painting Awarded Tank Job

MC Sandblasting and Painting, Inc. (Cedar Springs, MI) won a contract of $216,000 from the city of Belding, MI, to perform coatings work on two 500,000-gallon-capacity elevated water tanks. The project includes overcoating exterior surfaces, spot-coating interior surfaces on one tank, and fully recoating the interior and exterior surfaces of the second tank. The interior surfaces will be lined with epoxy systems, while exterior surfaces will be coated with a urethane system. The contract also includes epoxy coating of concrete foundation surfaces.



Caltrans Awards Tunnel Painting Project

The California Department of Transportation awarded a contract of $881,622.73 to Ashron Construction & Restoration, Inc. (Mountain View, CA) to coat concrete surfaces inside the Randolph Collier Tunnel, a two-lane, 1,886-foot-long tunnel under Oregon Mountain. The project includes cleaning 129,900 square feet of concrete surfaces and applying an acrylic emulsion coating to 122,100 square feet of concrete. The project also includes capturing existing lead-bearing coatings disturbed by the work.

River City Painting Wins Substation Coating Contract

Photo courtesy of Sacramento MUD

River City Painting, Inc. (Sacto, CA) was awarded a contract of $168,047 by the Sacramento Municipal Utility District to coat steel surfaces at 35 substations. The project, which is funded by the American Recovery & Reinvestment

Act, will address high temperatures inside the structures by applying a reflective coating system to surfaces impacted by direct sunlight. The metal will be cleaned using hand tools and power tools (SSPC-SP 2 and SP 3) and coated with a waterborne acrylic thermal coating system.

Quick Hits

V.H.P. Enterprises, Inc. (Tarpon Springs, FL), SSPC-QP 1- and QP 2-certified, was awarded a contract of $8,940,379.50 by the Oklahoma Department of Transportation to perform coatings application and various repairs on 43 bridges in Tulsa County.

The New York State Thruway Authority signed an agreement with Barton & Loguidice (Syracuse, NY) to perform coatings inspection services for an upcoming project. The project involves lead abatement and coatings application on 12 bridges in the Syracuse District.

CL Coatings, LLC (Mokena, IL) secured a contract of $405,060 from the North Shore Sanitary District (Gurnee, IL) to recoat various surfaces at two wastewater treatment plants and two pumping stations, including piping, structural steel, ductwork, aeration tanks, clarifier mechanisms, and final settling tank bridge supports.

The Illinois Department of Transportation awarded a contract of $133,993.62 to All States Painting, Inc. (Alexander, IL), SSPC-QP 1- and QP 2-certified, to perform surface preparation and sealant application on a total of 260,461 square feet of concrete bridge deck surfaces at various locations in Madison County.

S&T Painting, Inc. (Parkton, MD) won a contract of $12,800 from the Greater Lebanon Refuse Authority (Lebanon, PA) to recoat an enclosed ground flare stack at a landfill. The unit will be abrasive blast-cleaned to a Near-White finish (SSPC-SP 10) and coated with a heat-resistant silicone system.

Utility Service Co. Wins Reservoir Rehab

Utility Service Company, Inc. (Perry, GA) was awarded a contract of $642,700 by the town of Dover, NJ, to rehabilitate a 1.5 MG, welded-steel water storage reservoir. The project includes abrasive blast cleaning and recoating the interior and exterior surfaces. The interior will be lined with a 3-coat epoxy system, while the exterior, which is coated with lead paint, will be refinished with an acrylic polyurethane system.