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The Voice of SSPC: The Society for Protective Coatings

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26 OFFSHORE WIND FARMS: SUCCESSFUL CORROSION PROTECTION AND EFFECTIVE QUALITY MANAGEMENT

By Peter Kronborg Nielsen, FORCE Technology

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34 GREEN COATINGS FROM A GLOBAL PERSPECTIVE

By Don Futch, Jotun Paints, Inc.

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SSPC 2017 featuring GreenCOAT is scheduled for January 30 to February 2, 2017 at the Tampa Convention Center in Tampa, Fla. The SSPC 2017 Advance Program is published to help protective and marine coatings professionals plan their activities at the conference and exhibition. Details about events, awards, training courses, technical sessions, committee meetings, exhibitors and more are provided.





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As the unpredictable winter weather approaches and intensifies, coating contractors face the decision on whether to halt work for the season or to continue. Many contractors and owners believe that these projects must be delayed until warmer weather arrives, but there are alternatives to halting work just because it is colder out. With proper management and materials, applying coatings in cold weather can be just as effective as coating in warm weather.

Cold weather coating systems have been specially formulated so that they can be applied at temperatures as low as 0 degrees F. These coating systems offer the ability to achieve long-lasting protection to the substrate being coated despite low temperatures. Cold temperatures significantly change coating properties, such as the viscosity and cure rate. For example, at low temperatures, coatings may become more viscous and require thinning. During spray application, heating of spray lines can help to reduce the viscosity of the coatings being applied and maintain adequate material temperature, allowing for good atomization and flow. A coatings' cure rate can significantly be impacted as temperature drops. On a hot summer day, coatings may cure in just a few hours, but at 25 degrees F, coatings can take as long as 72 hours to cure. It is very important to refer to the coatings manufacturer's product data sheet for the cure rate at different temperatures. Ambient and surface temperature must also be monitored closely throughout any cold weather coating project. The surface temperature must be at least 5 degrees F above the dew point temperature to avoid moisture condensing and flash rust developing on the surface. The substrate must be dry and remain above the minimum specified temperature to achieve proper coating



APPLYING COATINGS IN COLD WEATHER

adhesion. Use of dehumidification or heating equipment within containment is just one solution for controlling ambient conditions. Dehumidification equipment alters the ambient conditions by removing moisture from the air, thereby reducing the chance of condensing moisture on the surface. Operating equipment, such as explosion-proof heaters, can raise the work area and surface temperature to an acceptable application temperature. Ductwork is often used to disperse the heat evenly throughout the containment. This helps to avoid extreme hot and cold spots at the areas closest and farthest from the heat sources.

When using containment to control environmental conditions, it is important to note that the surface temperature will take significantly longer to rise than the surrounding ambient air, which can delay paint application. This is a challenge during abrasive blasting operations as the dust collection may pull the heat out as fast as it is being put in. The containment designer should be consulted for suggestions on where to place heat sources and dust collection equipment to maintain proper ventilation while minimizing heat loss. Using heaters allows for stable working conditions and faster coating cure. The temperatures that are listed within the manufacturers' data sheets must be maintained through the cure cycle as well.

Cold weather will also affect the storage of paint and mixing operations. Paint must be stored and mixed at temperatures stated within the manufacturers' product data sheets to avoid crystallization and non-homogenous mixing of the coating. Storing paint in a controlled temperature room will avoid possibilities of coating failure. It may be necessary to document temperatures at different areas of the jobsite carefully as you may have one temperature for the storage area, one at the mixing station and another at the point of application, establishing a temperature range to reflect the hot and cold areas within the contractor's work zone.

There are many factors to consider when applying coatings in cold weather. Often the cost of the project may increase due to mobilizing dehumidification and heating equipment to alter the temperatures and purchasing alternate coating materials that contain additives to enable application in cold weather. As always, it is important to ensure that the owner is willing to accept alternative means and methods for the work being performed.

Dane Worms is SSPC's technical services coordinator. A Penn State engineering graduate, he assists SSPC in training development and in the course equipment area. He can be reached at dworms@sspc.org or 412-281-2331, ext. 2217.

SSPC Takes Expertise to Saudi Arabia

A team from SSPC: The Society for Protective Coatings journeyed to Saudi Arabia in late November to discuss coatings and corrosion challenges with employees and management of the Saudi Arabian Oil Company, commonly known as Saudi Aramco.

Beginning on Oct. 31, SSPC Executive Director Bill Worms, Director of Technical Services Michael Damiano and Director of Business Development Bob McMurdy joined new SSPC Board of Governors member Mana H. Al Mansour and senior staff from the Material Engineering division of Saudi Aramco's Consulting Services Department to discuss future collaboration and opportunities to improve the coating industry in the region.

"We were pleased with the visit and the quality of the discussions that we had with SSPC. The event was unique and first in kind in the region," said Al-Mansour.

While there, SSPC and Saudi Aramco jointly conducted two coating workshops, one for Saudi Aramco employees and one for the local coating contractors.

The workshop conducted at Saudi Aramco addressed the coating challenges in the oil and gas industry and covered various coating topics including surface preparation, coating specification and selection requirements; coating assessment, latest technologies; and required training and certification programs. More than 60 professionals from different operating facilities in



Photos courtesy of SSPC.

Saudi Aramco attended the workshop.

The second workshop, conducted at Le Meridien Alkhobar Hotel and attended by more than 120 participants from 52 companies.

"SSPC is a tremendous resource for the knowledge in coatings with many practical, hands-on programs that would benefit the coating activities that Saudi Aramco is doing both here and globally," Al-Mansour noted. "We felt it was important that SSPC did this

step to establish the link with the oil and gas companies and address the demand of international members."

Worms agreed, stating, "SSPC is excited with the opportunity to share information about our programs with companies like Saudi Aramco. By partnering with world-class organizations such as Saudi Aramco on training and certifications programs, we feel we can benefit both them, and the industrial coatings industry."

OSHA Anti-Retaliation Rule Takes Effect

After multiple delays, the anti-retaliation provisions of a new Occupational Safety and Health Administration rule went into effect on Dec. 1 after a federal judge rejected an industry request for an injunction to further postpone their implementation.

The Improve Tracking of Workplace Injuries and Illnesses Rule was originally set to go into effect Aug. 10, but was delayed until November, then again pushed back to Dec. 1, amid legal challenges from employers and organizations, including the Associated Builders and Contractors and the National Association of Manufacturers.

The suit against OSHA — which centers around several controversial provisions, including one barring some post-accident drug-testing — will go on, and the federal judge's refusal to issue a preliminary injunction does not mean the rule will necessarily withstand the challenge. It does, however, mean that OSHA may begin enforcing the rule as planned, unless and until the court rules against it in the suit. Judge Sam Lindsay issued his ruling on the preliminary injunction request on Nov. 28.

The new rule has two main parts: an electronic record-keeping and reporting requirement for on-the-job injuries and illnesses, and a set of anti-retaliation requirements.

Durability + Design-Sponsored Workshop on Coatings and Water Repellents New to SSPC 2017

A novel, three-part workshop at SSPC 2017 featuring GreenCOAT in Tampa will describe the capabilities of proprietary products for exterior concrete and masonry substrates.

The workshop, "Coatings and Water Repellents: Advantages and Disadvantages of Specific Brands," is designed to help owners, architects, consultants and contractors select specific coatings by brand name, not by a generalized — and sometimes vague — generic description.

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Four coating suppliers — The Sherwin-Williams Company, Sto Corp., PROSOCO and Benjamin Moore & Co. — will participate in the all-day workshop, first describing their coatings in the morning session, and then participating in an afternoon panel discussion in which they will explain the appropriateness of selecting their brands in eight scenarios of use.

For instance, one scenario involves a building in Chicago with CMU walls that has been painted twice since the original paint

was applied; there is extensive blistering and peeling, the walls are damp, but the contract calls for overcoating. The supplier panelists will explain the strengths and limitations of their products in achieving this overcoating successfully. Attendees will also be encouraged to ask questions during the panel discussion, and are invited to explore their own specific problems with the group.

Ken Trimber, president of KTA-Tator, Inc. and chairman of the SSPC's Commercial Coatings Committee, will moderate the workshop, which is sponsored by *Durability + Design* magazine.

The workshop will be held on Tuesday, January 31 at the Tampa Convention Center. Although it is a day-long workshop, attendees may choose to attend one, two, or all three sessions. Part one will run from 8:00 to 10:00 a.m.; part two will take place from 10:30 a.m. to 12:30 p.m.; and the final panel discussion session will run from 1:30 to 4:30 p.m.

SSPC 2017 featuring GreenCOAT will take place at the Tampa Convention Center from January 30 to February 2, 2017. The SSPC 2017 Advance Program is published on p. 45 of this issue; a description of this workshop can be found in the Technical Program, which begins on p. 60. More information is also available at www.sspc2017.com.

While the anti-retaliation aspect is presently being enforced, the electronic reporting requirement goes into effect on Jan. 1, 2017.

The anti-retaliation provisions seek to protect employees from actions that could be taken by an employer in retaliation for reporting an injury or illness. But some employers have argued that the rules go too far, and in some cases are unenforceable. Under the new rule, for example, an employer is prohibited from administering a drug test to an employee after a workplace incident, unless "drug use is likely to have contributed to the incident," and only if "the drug test can accurately identify impairment caused by drug use." The aim is to ensure that employees don't keep quiet about a workplace injury for fear of being subject to a drug test.



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But, as legal experts have pointed out, most tests cannot determine impairment at the time of the incident, only how much of a drug is in the individual's system at the time of the test. And there's no strict definition of when drug use is "likely to have contributed" to an incident. Industry groups have argued that OSHA is wrong to want to

prevent drug testing after workplace incidents, when drug testing can be an important tool in analyzing what went wrong.

Other aspects of the anti-retaliation provisions include banning practices like rewards (such as pizza parties) when a workplace goes a given period of time without a reported injury, because such practices could discourage employees from reporting incidents. While the plaintiffs in the suit, filed in the U.S. District Court for the Northern District of Texas, sought to delay the enforcement of the rule until the court could come to a decision on its legality, Judge Lindsay ruled that they did not show that they would suffer "irreparable harm" if the rule was enforced in the interim. "Potential future injury based on unfounded fear and speculation ... is insufficient to establish a substantial threat that irreparable harm will occur if a preliminary injunction is not granted," Lindsay said in his ruling. Analysts note that Judge Lindsay, in his ruling, did not suggest that the plaintiffs lack a case, simply that they could not meet the burden of proof necessary to put an immediate stop to enforcement.

THE BUZZ

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Building Blocks Break Bridge Record (Nov. 18)

Steel, concrete, wood ... plastic blocks? When it comes to bridge construction, LEGO bricks aren't usually counted among the standard building materials. A London professional association for civil engineers and technicians, however, has included the popular child's toy as the centerpiece of its Bridge Engineering exhibition.

At approximately 30 meters (almost 100 feet) in length, the Institution of Civil Engineers' (ICE) LEGO bridge is now the Guinness Book of World Records' longest suspension bridge span made entirely from LEGO, the association announced.

ICE notes that its replica of the U.K.'s Severn Bridge required 262,550 LEGO bricks to build a model with a total length roughly equivalent to three London city buses arranged end to end and a final weight of three-quarters of a ton.

Building the world's longest LEGO bridge is anything but child's play — its design and construction called on the skills and talents of industry professionals. Dr. Robin Sham, director of global long span and specialty bridges for infrastructure services firm AECOM worked closely with bridge designers on the LEGO bridge installation and consulted on the challenge of creating the structure using only the plastic bricks. Guinness requires that the LEGO bridge be free-standing without the aid of a reinforcing frame, glue or any other type of support.

"The construction was a fantastic opportunity to see civil engineering in action while using a material we all know and love," said Claire Gott MBE, design manager at global consultancy WSP | Parsons Brinckerhoff, whose bridge engineers supervised the construction of the LEGO bridge.



Photo courtesy of Institution of Civil Engineers (ICE).

WHAT'S GOT US TALKING

Blogger Warren Brand recently explored the phenomenon of "Normalization of Deviance," which occurs when people become so habituated to doing something a particular way that they no longer realize it is not the correct, most efficient, or most cost-effective way, even when it compromises their safety.

(PaintSquare Blog, Coatings Consult: Normalization of Deviance, Nov. 2)

Trevor Neale: "Hate to think our surgeons use N-Dev!"

Donald Wroble: "Points are plain common sense. Still see this mentality in many places across the U.S. The concept of normalizing deviance did make me laugh. I thought it was referring to politics, too."

Car F.: "I find this article to be a reflection of our current life-style and practices ... the unthinkable becomes normal, in small doses ... 'We've always done it like that,' is the common mantra."

M. Halliwell: "I had a prime contractor on a remediation site tell me to 'just do whatever you usually do' when I inquired with their project manager about their confined space entry protocols for going into a 13-foot-deep excavation ... Needless to say, their site superintendent was flabbergasted when I hauled out the supplied air gear, gas sampling gear, lifelines, harnesses to do it right. It went smoothly, I'm happy to report, but it was just one more example of the slide to 'it's fine ... we do it all the time.'"

Randy Berthold: "This should strike a cord with many owners and operators concerned with specifications involving protection against potential heavy corrosion and asset loss risk."

PSN TOP 10 (as of Nov. 30)

1. Painter Drowns After 5 Fall from Bridge
2. Architects Deconstruct Trump's Border Wall
3. Golden Gate Repainting Put Off, Report Says
4. Parsing Out Trump's Infrastructure Plan
5. Officials Investigate Partial Tower Collapse
6. 2 Painters Rescued from MI Water Tower
7. Bridge Falls, Kills 1, after Safety Warning
8. Sherwin-Williams, Valspar Respond to FTC Rumor
9. State Levies \$3M in Damages for Bridge Fire
10. Painter Injured in 40-Ft. Water Tower Fall

On Surface Treatment for Exceeded Overcoat Intervals

WHAT SURFACE TREATMENT IS BEST WHEN THE MAXIMUM MANUFACTURER RECOMMENDED INTERVAL FOR OVERCOATING HAS BEEN EXCEEDED?

Per Gabrielsson
Freelance Consultations and Inspections

Carry out careful manual roughening of the surface, but avoid scratching the surface. Sweep blasting may damage the structure of the coating to be overcoated and as this may not be detected, the entire job may be spoiled.

John Fauth
ChemMasters, Inc.

Consult the manufacturer's technical department for the recommended surface treatment or removal instructions.

Car F.
Municipal City

I would roughen the surface and apply a bonding coat. It would probably be less expensive than risking coating failures

in places where roughening wasn't possible. A mistake like that would probably happen only once — then the lesson is learned.

Om Prakash Jat
Tech International

Abrade the surface properly with No. 60 or 80 sandpaper and then apply an additional coat. Sweep blasting may damage the surface and the paint film could be contaminated. One could apply a bonding coat if it is recommended by the paint manufacturer.

Luis Bonifacio
Martifer Metallic Constructions

We had that problem on a new railway bridge which was sent to the site with primer and intermediate applied, with the topcoat to be applied after erection. Due

to delays, the overcoating time was exceeded and the manufacturer's recommendation was to hydroblast at 500 bar (7,300 psi) and apply the topcoat. More than 20 pull-off adhesion tests that were done three months after application revealed values of over 12 MPa (1,740 psi). One year has passed and the result is still acceptable.

Mariana Huhulea
SeaQuest Marine Project Management
In shipbuilding, I would say that this is the worst-case scenario. For an expired coating in a water ballast tank, power-tool roughening would be, in most situations, the best option among just a few alternative solutions. Special attention must be paid to the edges and manual weld seams where power tools cannot entirely reach — manual corrections made by coarse sandpaper are a must. Dust collectors are highly recommended for the job. (Even so, when the job is completed, the tank looks like a flour can with people dipped into it.) Ventilation adjustment during vacuum cleaning is also very important. Personally, I am in full favor of garnet sweep blasting for its effectiveness and lesser delays; however, the risk of failure is higher if the contractor does not have the understanding and skill for a good sweep blasting.



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PREVENTING COATING PROBLEMS AND FAILURES ON BOLTED BRIDGE CONNECTIONS

All photos courtesy of KTA-Tator, Inc.

BY JAMES D. MACHEN, KTA-TATOR, INC.

Rather than describe a failure that has already occurred, this article addresses key steps to follow when painting bolted connections in order to *prevent* failures from occurring by focusing on surface preparation and painting practices that have been used successfully on bolted bridge connections such as splice plates and gusset connections for new construction projects or new steel additions to existing bridges. Larger connection surfaces are typically shop blast-cleaned and shop primed only with an inorganic or organic zinc-rich primer and then bolted together in the field using hot-dipped-galvanized (HDG) or mechanically galvanized bolt assemblies consisting of a nut, bolt and washer. Smaller shop-primed connections are sometimes bolted in the shop prior to shipping. Field finish painting of bolted connections is typically accomplished using an epoxy intermediate coat followed by a urethane finish coat. However, some bridge owners specify the application of an organic zinc-rich primer on mechanically galvanized bolt assemblies prior to the epoxy intermediate and urethane finish. Because galvanized bolt assemblies (as opposed to plain black bolts) are typically used in conjunction

with steel connections primed with zinc-rich primer in the shop, that is our focus here.

While the paintable surface area of bolted bridge connections is small compared to the whole structure, on larger structures, individual connections can contain dozens or even hundreds of closely spaced bolt assemblies. Because the bolt assemblies have a more complex configuration and are spaced so closely, cleaning and painting these surfaces presents challenges that require more time, effort and expense to properly complete, versus other bridge surfaces. Proper painting of bridge connections is critical because these are the surfaces where premature coating problems often begin. Standard practices used by various bridge owners and recommended by paint manufacturers are addressed in this article.

SURFACE PREPARATION OF GALVANIZED BOLT ASSEMBLIES

Galvanized bolt assemblies are typically used in conjunction with new steel that has been shop-primed with a zinc-rich primer. The primary challenges encountered with the field surface preparation of galvanized bolt assemblies for painting includes preparing

areas of rusting or damaged galvanizing and the removal of nut lubricants.

PREPARING RUST AND DAMAGED GALVANIZING ON BOLT ASSEMBLIES

Rusting and damaged galvanizing on bolt assemblies is most often a result of the field tensioning/tightening of the bolts by other crafts. The socket attached to the torque wrench typically damages (i.e. smears or burnishes) or removes the galvanizing on the outside corners (edges) of the bolt heads and nuts, and the bolt threads are sometimes damaged as the nut tightens. The zinc-rich primer on the connection plate around the base of the bolt assembly can also be damaged — usually smeared or burnished. As an example, Figure 1 (p. 14) shows damage and rusting along the two bottom rows of galvanized nuts that exceeds what is typically observed on bridge projects. In this case, the galvanizing was damaged by using too large of a socket when tightening was performed. Care must be taken to use the proper tools and techniques during installation.

SSPC-PA Guide 13/AASHTO NSBA Steel Bridge Collaboration S.8.1: "Guide Specification for Application of Coating Systems with Zinc-Rich Primers to Steel Bridges" provides guidance for cleaning and painting bolted bridge connections.

For removal of rusting and preparation of damaged galvanizing, SSPC-PA Guide 13 recommends cleaning in accordance with SSPC-SP 1, "Solvent Cleaning," SSPC-SP 2, "Hand Tool Cleaning," SSPC-SP 3, "Power Tool Cleaning," or by pressurized water cleaning in accordance with SSPC-SP 12 (waterjetting), however, SSPC-SP 12 has been discontinued and replaced by four individual waterjetting standards, SSPC-SP/NACE WJ-1 through WJ-4. WJ-4, "Waterjet Cleaning of Metals – Light Cleaning" would apply in this case.

These cleaning methods only require the removal of loose rust, galvanizing or zinc-rich primer from the damaged or rusted area. Field experience has shown that more intensive cleaning to remove all



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Fig. 1: The two bottom rows of bolts show damage to the galvanizing caused by tightening with too large of a socket.

spot-rust results in little, if any, improvement in paint system performance and the extra time, expense and effort required to accomplish removal is not warranted. Inquiries to bridge owners and coating manufacturers confirmed that their standard practices and recommendations for field cleaning of bolted connections are consistent with the methods discussed previously.

Also, when preparing galvanized bolt assemblies for painting, care must be taken that the galvanized surface is not overly smoothed or polished by the cleaning process — for example, by aggressive power wire-brushing. Such surfaces are not as easily “wetted-out” by coatings and do not provide sufficient surface roughness or a “tooth” to which coatings can adhere.

Because the surface of a mechanically galvanized bolt assembly is typically rougher and more porous than HDG, solvent cleaning and light hand-brushing

with a wire brush or stiff composite bristle brush is typically effective for preparing the surface for painting.

In addition, some expect that the paint adhesion on galvanized bolt assemblies should be equal to that system on the steel, which is often not the case. On one bridge project, concerns arose because field knife adhesion testing on HDG bolts caused forced separation of the system from the galvanizing, whereas the same paint on the surrounding inorganic zinc-primed steel could not be removed to the substrate. Further, laboratory adhesion testing on numerous painted test panels with galvanized bolts installed also showed that adhesion was weaker on the galvanized bolt assemblies even though the performance was excellent. Before field adhesion concerns are raised, the expectation should be known. Attempting to compare paint adhesion values on galvanized (particularly on smooth HDG) versus inorganic

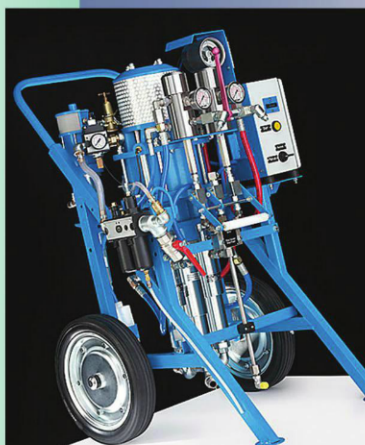


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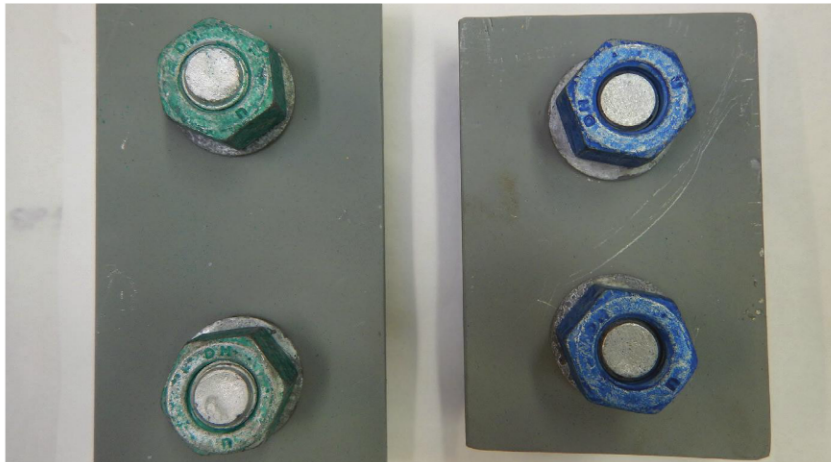


Fig. 2: This photo shows nut lubricant on hot-dipped-galvanized bolt assemblies (green, left) and mechanically galvanized bolt assemblies (blue, right).

zinc-primed steel is likely not valid. If there is a desire to improve the adhesion of the coating to the HDG, cleaning/etching solutions are available that can be applied to the surface before painting. Some of these solutions require post-rinsing and neutralization (usually with clean potable water) but "no-rinse" formulations are also available.

Unless extensive paint damage or rusting is present on the bridge connection, complete abrasive blast-cleaning and repainting of bridge connections is typically not recommended. Blast-cleaning can damage or remove the superior corrosion protection properties provided by the galvanizing on the bolt assemblies and the shop-applied zinc-rich primer on the connection plate. Blast-cleaning often mandates the construction of a containment around individual bridge connections and the process also increases the potential for over-blast damage of adjacent painted bridge surfaces that must be repaired. All of this can add cost and prolong the project unnecessarily.

REMOVAL OF NUT LUBRICANTS FROM BOLT ASSEMBLIES

Nut lubricants are typically formulations of wax-based material pigmented with a blue or green dye (Fig. 2). The lubricant is shop-applied to nuts to reduce friction during field tensioning of bolts and is most

commonly applied to the entire nut and internal threads. As the nut is tightened the lubricant often spreads onto the surface of the bolt, washer and connection plate. Because the lubricant is typically wax-based, if excessive amounts are present, it

can be a deterrent to coating adhesion so some amount of removal is required before any paint is applied. Research into the cleaning methods recommended by paint manufacturers and specified by bridge owners indicates that solvent cleaning with methyl ethyl ketone (MEK), chemical cleaning with alkaline cleaners, or pressurized water cleaning can be effective for removing nut lubricants. SSPC-PA Guide 13 also addresses the removal of lubricants prior to painting and indicates that household cleaners such as ammonia are effective. However, issues with the removal of nut lubricants have occurred because the colored dye can stain the galvanizing on the bolt assembly. Further, complete removal of the dye from the many crevices present on the bolt assembly can be difficult. The visible presence of the dye after cleaning raises concerns as to whether wax is still present and as a result, some specifiers require that all dye be removed

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as a precaution. In the author's experience, the dye is easier to remove from HDG bolt assemblies than from mechanically galvanized assemblies.

With reference to dye removal, SSPC-PA Guide 13, Section 5.4.4 and C5.4.4 (the commentary for that section) states the following.

"5.4.4 ... The lubricant on exposed surfaces of installed nuts must be removed before painting. The identity of solvents and methods needed to remove the lubricant is obtained from the galvanizer and provided to the General Contractor, shop and field painters, the Owner and other interested parties, with a description of the cleanliness necessary for coating

adhesion. Perform periodic evaluation to ensure that the lubricant and excess dye are adequately removed."

"C5.4.4 ... Any dye color remaining on the galvanized nuts after weathering or the required surface preparation is not believed to be detrimental to subsequent coating performance or appearance. A white cloth wipe test with no color transfer can be used to confirm that all lubricant and non-absorbed dye has been removed, leaving only the residual 'stain' on the surface."

Because SSPC-PA Guide 13 does not address the amount of residual stain that is acceptable, a project-specific field mock-up demonstrating cleaning and painting of the bolt assembly is recommended. The mock-up should be performed before production work begins in the presence of all concerned parties. A mock-up allows for the expectations to be identified in advance and the means and methods for achieving the cleanliness to be demonstrated. Adhesion tests can also be conducted to verify the acceptability of the cleaning. Adhesion testing by probing with a razor knife similar to the methods described in ASTM D6677, "Standard Test Method for Evaluating Adhesion by Knife" can be used. An advantage of the field mock-up is that the amount of absorbed dye staining permitted to remain on the bolt assembly surfaces and in the crevices can be photographed and used as a job reference standard.

The author was involved with a project that required essentially every trace of dye to be removed. This process was extremely labor intensive and costly, which led to project disputes and delays. The ultimate resolution was to establish the cleanliness expectations through mock-ups involving different levels of dye removal. After progressive removal of the dye, the coatings were applied and adhesion testing was conducted.

Figure 3 shows photographs from the testing that depict both pre-cleaning and post-cleaning conditions of bolt assemblies. For this test, solvent cleaning with

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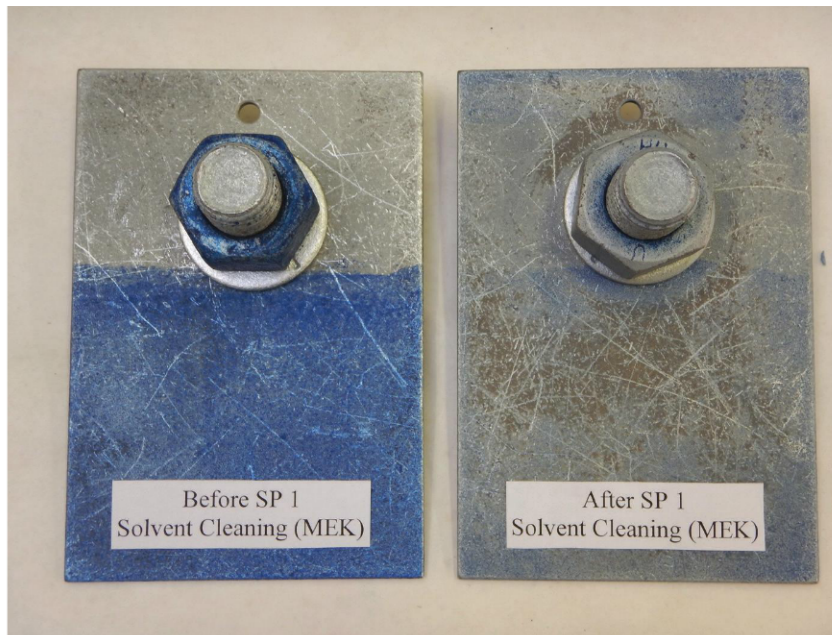


Fig. 3: This photo depicts both the pre-cleaning and post-cleaning conditions of bolt assemblies. For this test, solvent cleaning with MEK was most effective for removing the blue-colored nut lubricant.

MEK was most effective for removing the blue-colored nut lubricant. On other projects, foaming glass cleaners containing ammonia and foaming alkaline-type household cleaners have also been effective in removing nut lubricants. The tests also indicated that supplementing the use of the wet cleaners with a non-scratch scouring pad or a composite bristle brush improved lubricant removal. The mock-up resolved the problem in this case, but only after considerable time and money had been spent. It should have been done in advance.

ADDITIONAL NUT LUBRICANT OPTIONS

Other options for nut lubricants that can minimize field cleaning requirements include purchasing nuts with the lubricant applied only to the nut threads and mating face rather than to the entire nut. This significantly decreases the amount of nut lubricant that must be cleaned prior to



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painting. Referring again to Figure 1, it is apparent that the nuts pictured were incorrectly installed. The lubricated face of the nut should be mating against the washer so that no lubricant is visible. However, for many of the nuts, the unlubricated face was installed against the washer and the lubricated face exposed. Workers installing the nuts must be properly instructed and trained. In this case, good decisions had been made to address the lubricant through product selection, but the project fell apart when the nuts were installed incorrectly.

While specialized lubricant is initially more costly than standard wax-type lubricants applied to the entire nut, those costs may be offset by the reduced cleaning effort that is necessary in the field.

PAINT APPLICATION ON BOLT ASSEMBLIES

The configuration of bolt assemblies is a combination of outside edges, inside and outside angles, bolt threads and crevices

that can be challenging to paint. Edges, bolt threads and inside/outside angles are more difficult to coat with a uniform paint film because of their small surface area and complex configurations. Surface tension forces during the drying/curing process can actually pull many applied coatings away from edges and angles, resulting in a thinner protective layer on these surfaces. Surface tension also inhibits the flow-out of paint into the many crevices that are present on bolt assemblies such as crevices between the bolt head and the steel surface, the washer and the steel surface, the nut and the washer, and the nut and bolt threads.

The most common and practical solution to provide additional corrosion protection and coating coverage is to brush apply a stripe coat. The brushing action helps the paint to overcome surface tension by *forcing* the paint into the crevices and other irregularities. In addition,

thinning of the paint often facilitates flow-out, wetting and ease of application of the stripe coat material. In many instances, particularly with large, concentrated bolt assembly patterns, it may be advantageous (more productive and less time-consuming) to spray-apply the paint to the connection followed by immediate back-brushing to work the paint into the bolt assembly. Some prefer conventional spray over airless spray for stripe coating because equipment adjustments can be made that give the applicator more control when painting the complex shapes and surfaces. The advantages of stripe coating are described in SSPC-PA Guide 11, "Protecting Edges, Crevices and Irregular Steel Surfaces by Stripe Coating."

On several projects, inadequate coating coverage on certain faces of the nuts would have been prevented had brush stripe coating been specified. In these



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cases, the bolt assemblies were only spray painted. Because the spray application was not performed from all directions, some faces (typically the same nut faces on all connections) were not painted. For example, if the nuts are only sprayed from 2:00 through 6:00 and up to 10:00, the coverage is only good on those surfaces. The remaining surfaces from 10:00 through 12:00 to 2:00 are completely missed.

Thinner addition should always be in accordance with the manufacturer's recommendations and the stripe coat thickness should be kept as thin as possible, applying just enough material to thoroughly coat all bolt assembly surfaces. It is the opinion of some that a bolted assembly is not properly coated until all crevices between the various assembly components have been visibly bridged and sealed with paint. However, if all exposed surfaces are painted, attempting to bridge crevices with paint is not necessary and can result in the application of an individual layer that is too thick. Excessively thick coatings are subject to increased internal curing stress (i.e. contractive shrinkage stress) that can lead to premature cracking and peeling, and/or solvent retention that can result in the formation of blisters, pinholes and voids in the paint film. In addition, if the bridge structure is subject to vibration and movement, excessive paint thickness around bolt assemblies may be more prone to cracking.

While some specifications require an organic (epoxy) zinc-rich primer to be used for the stripe coat on galvanized bolt assemblies, the use of epoxy intermediate coat material for this purpose is often preferred, particularly surface-tolerant, epoxy mastic-type products. The reason is that organic (epoxy) zinc-rich primers, which are highly filled with metallic zinc dust, may lack the ability to sufficiently wet-out the galvanized surface to develop adequate adhesion. On the other hand, epoxies are typically more user-friendly, more surface-tolerant, and flow-out, wet-out and adhere better to the galvanized fasteners than do epoxy zinc-rich primers. In some instances, multiple stripe coats are

specified to improve coating performance on complex surfaces. Multiple stripe coats are advantageous if the thickness of an individual application is not excessive.

SUMMARY

Field cleaning and painting of bridge connections can be more labor intensive, time

consuming and costly to perform compared to painting any other bridge surfaces, but proper cleaning and painting of the connections is critical in order to prevent premature corrosion, poor adhesion and cracking or disbonding of the coating.



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Office to Field: Lost in Translation



UPDATE: SAFETY AND HEALTH PROGRAMS AND MULTI-EMPLOYER RESPONSIBILITIES

BY ALISON B. KAELIN, CQA, ABKAELIN, LLC

Here we go into a new year. We've elected a new president and in what may be an OSHA version of the November surprise, Dr. David Michaels, the longest-serving Assistant Secretary of Labor for Occupational Safety and Health, completes his tenure at OSHA while issuing new regulatory guidance on safety and health programs and multi-employer responsibilities.

On October 18, 2016, OSHA released "Recommended Practices for Safety and Health Programs" (SHP) to establish an approach for improving safety and health in the workplace. OSHA had not updated its SHP guidelines since 1989. The current update reflects changes in economy, changes in the workplace, and evolving safety and health issues. It also addresses multi-employer workplaces and puts a greater emphasis on continual improvement. The guidelines are built around seven SHP core elements.

1. Management leadership.
2. Worker participation.
3. Hazard identification and assessment.
4. Hazard prevention and control.
5. Education and training.
6. Program evaluation and improvement.
7. Communication and coordination for host employers, contractors and staffing agencies.

The recommendations are advisory only and do not create any new legal obligations or alter existing obligations created by OSHA standards or regulations.

The guidelines correspond to a new OSHA website (<https://www.osha.gov/shpguidelines>) that allows employers to walk through the recommendations and explore various helpful tools.

MULTI-EMPLOYER WORKPLACES

The industrial painting industry, among others, has struggled to determine our risk and responsibilities as owners, architects/engineers, contractors and subcontractors. OSHA has continued to transform our understanding of this complete interconnection of liability, most recently in the updated guidelines. The relationship between contractors and subcontractors has been clearly established in 29 CFR 1926.16 - Rules of Construction. There are four basic tenets, emphasized in bold with annotations in brackets.

1. **"In no case shall the prime contractor be relieved of overall responsibility for compliance with the requirements of this part for all work to be performed under the contract."**
2. **"By contracting for full performance of a contract subject to section 107 of the Act [such as for bridge or tank painting], the prime contractor assumes all obligations prescribed as employer obligations under the standards contained in this part, whether or not he subcontracts any part of the work."**
3. **"The prime contractor assumes the entire responsibility under the contract and the subcontractor assumes responsibility with respect to his portion of the work. With respect to subcontracted work, the prime contractor and any subcontractor or subcontractors shall be deemed to have joint responsibility."**
4. **"Where joint responsibility exists, both the prime contractor and his subcontractor or subcontractors, regardless of tier, shall be considered subject to the enforcement provisions of the Act."**

The aforementioned provisions are incorporated by reference as part of the OSHA Lead in Construction Standard, paragraph (e)(2)(ii)(H) which requires that lead compliance programs contain **"a description of arrangements made among contractors on multi-contractor sites with respect to informing affected**

employees of potential exposure to lead and with respect to responsibility for compliance with this section as set forth in § 1926.16."

The Hazard Communication Standard requires that on multi-employer work sites where employers may expose others to hazardous chemicals that their hazard communication programs must include "methods to provide the other employers on-site access to safety data sheets (SDSs) for each hazardous chemical to which the other employer(s)' employees may be exposed, method(s) of informing other employers about any necessary precautionary measures to protect employees and how to inform other employer(s) about the labeling system used.

The recent "Confined Spaces in Construction" standard goes into great detail discussing the interactive roles,

risks and responsibilities of the host, controlling contractor and subcontractors by establishing methods to share information about hazard recognition so that all exposing parties understand potential hazards.

The communication element for the recommendations related to SHP addresses the responsibilities of the host versus the contractors and is described in Table 1.

In a companion piece to the recommendations, OSHA provided a document titled "Safety and Health Program Existing OSHA Standards Crosswalk." This tool identifies overlaps between existing OSHA standards (including the OSHA Lead Construction Standard) and the seven core element action items described in the "Recommended Practices for Safety and Health Programs." A secondary purpose of this publication is to

Table 1: Recommended Communication — Host vs. Contractor

Host	Contractor (Subcontractor)
An employer who has general supervisory authority over the work site, including controlling the means and manner of work performed and having the power to correct safety and health hazards or require others to correct them.	An individual or firm that agrees to furnish materials or perform services at a specified price, and controls the details of how the work will be performed and completed.
Responsibilities	
<p>Include in contracts and bid documents any safety-related specifications and qualifications and ensure that contractors selected for the work meet those requirements.</p> <p>Each host employer establishes and implements a procedure to ensure the exchange of information about hazards present on site and the hazard control measures in place.</p> <p>The host employer gathers and disseminates information sufficient to enable each employer to assess hazards encountered by its workers and to avoid creating hazards that affect workers on the site before on-site work starts and, as needed, if conditions change.</p> <p>The host employer communicates with contractors to determine which among them will implement and maintain the various parts of the safety and health program to ensure protection of all on-site workers before work begins.</p> <p>Make sure that managers with decision-making authority are available and prepared to deal with day-to-day coordination issues.</p>	<p>Each contractor establishes and implements a procedure for providing the host employer with information about the hazards and control measures associated with the work being done by its workers, as well as the procedures it will use to protect workers on the site.</p> <p>The contractor communicates information before on-site work starts and, as needed, if conditions change.</p> <p>Contractors regularly give the host employer any information about injuries, illnesses, hazards, or concerns reported by their workers and the results of any tracking or trend analysis they perform.</p> <p>Contractors make sure that managers with decision-making authority are available and prepared to deal with day-to-day coordination issues.</p>

help identify how to comply with those safety and health standards that apply.

SO WHAT DOES THIS MEAN TO US?

Under the current OSHA construction regulations (1926.16 and 1926.62) contractors and subcontractors are jointly liable for compliance and that contractor assumes all employer obligations under the standards. But what about owners?

For years, the SSPC C3, "Lead Paint Removal" program has taught that owners can protect themselves from liability by having performance-based specifications and providing reasonable oversight during the work. We've also held that while it was desirable for owners to provide specific guidance for contractor compliance with OSHA standards, many have elected to remove the items from their specifications. Additionally, while we hope that owners identify and disclose the presence of lead and other

regulated coatings constituents as part of the pre-bid documents, we've taught that it is the responsibility of the contractor to assess potential hazards under the OSHA General Duty Clause, (Section 5[a] [1] of the Occupational Safety and Health Act [OSHA] of 1970).

Under the latest recommendations for SHPs, OSHA appears to indicate that host employers also have specific responsibilities (and presumably risk and liability) for the safety and health of the contractors working for them.

Let's look at how these new requirements may affect a typical bridge rehabilitation project on a previously coated bridge and see what they suggest.

1. The host (owner) should test, evaluate, identify and communicate existing hazards on-site to the contractor(s). This could include identification of hazardous coatings, but also potential permit-required confined spaces, conditions such

as heights above 6 feet or electrical power lines.

2. The host should not only develop contracts, safety-related specifications and qualifications (such as SSPC-QP 2 certification or lead training), but must also ensure that contractors and their subcontractors selected for the work are notified of existing hazards and have the qualifications to meet those requirements.

a. Contractors who subcontract portions of the work are obligated to notify subcontractors of potential hazards and evaluate subcontractor qualifications and performance. Contractors remain liable for subcontractor compliance.

3. The owner, contractor and subcontractors must have specific, coordinated safety and health programs in place to protect all exposed workers on-site. The host should verify that each contractor has

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and understands the parts of the SHP for which they are responsible.

4. The owner, contractor and subcontractors must continually communicate with each other about existing or new hazards. For example, the coating contractor may need to advise other contractors and subcontractors about the presence of lead, the performance of OSHA trigger tasks and the potential for exposure during down-stream activities such as containment system demobilization, clean-up or waste handling. The owner would also have to identify any hazards they've introduced (such as solvents and coatings).

5. The owner, contractor and subcontractors must have management, qualified or competent persons on-site (as applicable) when hazards are present, who have decision-making authority (such as QP 2-certified personnel) to stop and correct hazardous conditions.

SUMMARY

Going into 2017, make sure you understand your role in multi-employer work-site safety. As a host or a contractor, have you properly identified hazards and incorporated safety-related information into your specifications or purchase orders? Are you reviewing contractor and subcontractor qualifications and SHPs? Are we protecting all on-site workers from the hazards we know about or create, regardless of who employs them? Becoming educated about requirements and recommendations can help to safeguard everyone involved in a project.

ABOUT THE AUTHOR

Alison B. Kaelin, CQA, has more than 30 years of public health, environmental, transportation and construction management experience in the coatings industry. She is the owner of ABKaelin, LLC, a provider of OSHA training, quality



assurance, auditing, consulting, and related services to the protective coatings, construction, fabrication, and nuclear industries.

Kaelin is a certi-


fied quality auditor and a NACE-certified Coating Inspector. She was a co-recipient of the 2016 Coatings Education Award, a co-recipient of the inaugural SSPC 2014 Women in Coatings Award, a 2012 JPCL Top Thinker, a 2012 JPCL Editor's Award Winner and an SSPC Technical Achievement Award winner in 2005. Kaelin is also a JPCL contributing editor.

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Following an uncertain start, the present offshore coating systems for wind farms have shown fine durability against aggressive marine environments. In this article, positive features from the first wind farms with more than 15 years of service are described, and the importance of quality management is explained.

Constructions such as offshore wind farms are subject to aggressive environments. They are exposed to humidity with high salinity and to intensive UV-radiation. The UV-radiation occurs directly on the structures as well as from light reflections from the sea.

Additionally, an area of concern is the tidal zone, or splash zone, where the wind turbine construction is stressed both from mechanical impacts — service boat collisions and waves — and from corrosion created by shifting saline seawater with a high oxygen level. The seawater stress levels can be extensive in waters with high tidal activity, such as the Irish Sea or the English Channel.

Thus, in particular, the protection of the wind turbine foundation, the transition piece (TP), is imperative (Fig. 1, p. 28). Long-term resistant coating systems with no need for future refurbishment combined with flawless application operation activities are essential, as offshore repair is costly.

NORTH SEA WIND FARMS — THE BEGINNING

The first wind farm in the North Sea, Horns Rev 1 (HR1), was planned in the mid-1990s. At the time, designers considered using offshore coating systems from the oil and gas industry to prevent corrosion. In particular, the Norwegian standard on coatings, NORSOK M-501¹, was studied.

However, and against all earlier studies and NORSOK M-501 systems, the previous owner of HR1 selected a two-coat, ceramic-reinforced epoxy system, applied wet-on-wet with a total dry film thickness (DFT) of 350 µm (13.7 mils) for the TP and the upper part of the monopile (MP) (-2m mean sea level [MSL] and upwards). The paint system had been approved following the testing regime of NORSOK M-501, in this case being applied as a two-coat system with drying between the coats. Such a lean system was seldom used for splash-zone areas.

OFFSHORE WIND FARMS SUCCESSFUL CORROSION PROTECTION AND EFFECTIVE QUALITY MANAGEMENT

BY PETER KRONBORG NIELSEN, FORCE TECHNOLOGY

Fig. 6: This photo shows the corrosion attacks in 2015 on TPs coated with the lean 350 µm permeable coating system. Photo courtesy of Morten Mortensen, Hempel A/S.

As a test, the last five of the 80 TPs at HR1 were painted with a two-coat solvent-free epoxy system, at a total DFT of 1,000-to-1,100 µm (40-to-43 mils), and with drying between the coats.

The interior of the TPs and the rest of the MP were left uncoated. Sacrificial anodes were installed on the outside of the TP for corrosion protection of both the underwater part of the TP and the MP.

The railings on the TP platform were hot-dipped-galvanized steel, with a DFT of approximately 150 µm (6 mils).

The turbine tower itself was protected with a well-known epoxy/polyurethane (PU) system, primed with a thermally sprayed zinc/aluminium 85/15 coating. This system had a long and successful on-shore track record and also in coastal areas.

THE FIRST EXPERIENCES

Within the first two years of service, pinpoint corrosion was observed on the TPs painted with the lean 350 µm two-coat epoxy system (Fig. 2, p. 29).

The corrosion took place both in the atmospheric and splash-zone areas of the TP. A forensic investigation showed that the corrosion started as blistering on the coated surface and as the blisters ruptured from wave and tide movements, corrosion started. The cause of damage turned out to be the lean coating combined with insufficient grinding of the ceramic extenders in the paint. Microscopic analyses of pieces of paint flakes showed that the extenders had not been ground sufficiently during the production of the paint. This defect and the low DFT of the coating permitted pinpoint access of salty water to the steel surface. The surface (that is, the film) had become permeable (Fig. 3, p. 30).

Cathodic disbondment of the coating system may also have contributed to the generation of blisters in the splash zone.

It should be added that at present, the corrosion damage is not considered to be detrimental to the TPs of HR1. Due to the original conservative corrosion allowance in the structure, the integrity of the wind farm is intact and therefore, the present owner of HR1, Vattenfall A/S, expects the farm to be in service as planned until the mid-2020s.

It should also be mentioned that ceramic-reinforced epoxy paint systems have shown relatively good protection over 15 years in the Swedish Yttre Stengrund decommissioned wind farm in the Baltic Sea (Fig. 4, p. 30).

The two-coat epoxy system at 1,000-1,100 µm DFT on the last five of the HR1 TPs has shown good and lasting resistance, apart from damage caused by impact from supply boats, and the protection remains intact today, as shown in Figure 5 (p. 30). As a comparison, Figure 6 shows the corrosion attacks in 2015 on TPs coated with the lean 350 µm permeable coating system. Consequently, the

two-coat solvent-free coating system with the high DFT became a starting point for suitable coating systems meant for future wind farm projects.

Later inspections at HR1 and other wind farms have shown that the interior of the TPs and MPs had to be better protected^{2,3}.

LATER AND PRESENT PAINT SYSTEMS

Jackets for Substations and External TPs

Following the experiences from HR 1, new coating systems were introduced. The new paint system on the exterior of jackets and TPs is seen in Table 1 (p. 28).

The paint system has shown excellent durability on projects in the North Sea, the English Channel and the Irish Sea. The few damages observed originated from inferior quality control during the painting process described later, and from blows during installation activities and collisions. The protective ability of the paint system in marine environments is confirmed.

Stripe-coating on welds and edges between every coat of paint has always been specified and the structures have benefitted from the positive results.

As with all industrial enterprises, all parties involved in wind farm projects are constantly searching for ways to reduce construction costs, the cost of paint and painting among these. Based on the positive experience with the epoxy/PU system and due to new developments of these types of paints within the last five years, the paint manufacturers have proposed that the system listed in Table 1 be modified from a four- to a three-coat system. The paint manufacturers' recommendation is justified from pre-qualifications in the NORSOK M-501 and ISO 20340 testing regimes and also from positive references from the offshore oil and gas industries. Thus, the paint system used in the latest U.K. projects is the three-coat system listed in Table 2 (p. 28).

To apply three coats instead of four and to reduce the paint consumption will naturally create a cost reduction, but some operators still favor the four-coat system in Table 1 to obtain a higher safety margin.

The Interiors of TPs and Interiors and Exteriors of MPs

Throughout the first wind farm projects, owners and consultants had assumed that the interior part of the foundations did not need any corrosion protection. It was anticipated that the air inside the inner cavity would be deprived of oxygen after a short time, and that the internal tidal movements

Table 1: Paint System for Jackets on TPs

Type	NTFT, μm
High-build epoxy primer	250
High-build epoxy intermediate coating	250
High-build epoxy intermediate coating	250
Polyurethane (PU) topcoat	80
Total dry film thickness	830

Table 2: Revised Paint System for Jackets on TPs

Type	NTFT, μm
High-build epoxy primer	300
High-build epoxy intermediate coating	300
Polyurethane (PU) topcoat	60
Total dry film thickness	660

would be insignificant and thus, no corrosion should be possible. However, history demonstrated otherwise as older wind farms have experienced substantial corrosion in the interiors of TPs and MPs². Consequently, these inner areas are now being coated in newer projects.

The outside of the uncoated, submerged MPs was relatively protected by anodes. But to reduce anode consumption and to avoid costly corrosion protection retrofit solutions due to under-protection of the structures (for example, the

installation of remote anode sleds), owners and contractors soon agreed to partly coat the outside of the MPs.

The specified coating system for the inner and outer MPs is a traditional two-coat epoxy system, such as recommended in NORSOK M-501 (System 7B, 350+ μm). It is essential that the epoxy coating be resistant to cathodic disbondment.

The Railings

The railings and balusters on the outdoor platform on TPs are now thermally

sprayed and then coated with epoxy/PU systems. Some projects have also used stainless steel such as EN 1.4404 or aluminium such as the EN AW 5000-series for railings and balusters.

The Appurtenances

Accessories such as outer ladders, platforms and fenders are protected with the system shown in Table 2. Over the years, the appurtenances have received various treatments on the individual wind farms, but Table 2's epoxy/PU system has shown the best resistance — in particular because the selected epoxies have been the impact-resistant ones ("icebreaker epoxies"). On some projects, non-immersed parts have been primed with thermally sprayed zinc/aluminium (85/15) prior to painting.

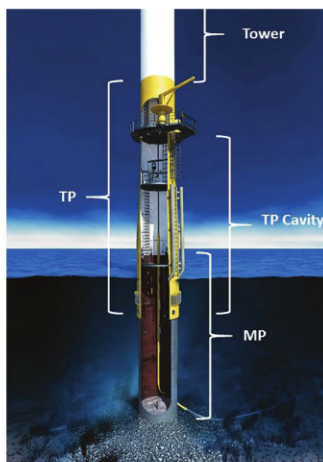


Fig. 1: Offshore wind turbine construction showing the tower; transition piece (TP), transition piece cavity and the monopile (MP) which is the underwater support of the tower and TP. Photo courtesy of FORCE Technology.

QUALITY CONTROL OF STEEL AND SURFACE TREATMENT ON WIND FARMS

An important control issue on all projects has been, and remains, nondestructive testing (NDT) checks of all welds and joints. All parties involved have realized the importance of systematic control and it is a statutory requirement from the classification societies.

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Fig. 2: At the Horns Rev 1 (HR1) facility, pin-point corrosion is noted on TPs painted with the lean two-coat epoxy system. Photo courtesy of FORCE Technology.

treatment, the attitudes of some owners of initial wind farm projects were somewhat reserved. Quality checks of painting operations were infrequent. Fortunately, the approach to painting quality control — third-party quality control in particular — is now positive, and all projects are now checked. The main quality control guidelines have been NORSOK M-501, Annex D, or ISO 12944-8, and all contractors' daily logs are supplemented with third-party painting inspection activities. Thus, damages and corrosion attacks originating from poor painting operations have been drastically reduced.

DEFECTS

Paint Errors

Apart from the previously mentioned poor grinding, poor paint rheology has also been observed on a few projects. The result has been sagging and improper coating continuity. Formulation modification and proper paint control have reduced these defects. The contractors have also introduced more skilled master painters for the jobs.

Poor opacity of the yellow topcoat has also been seen. The remedial measure here has been to choose a whitish/yellowish-colored intermediate coat. Additionally, the topcoat paint formulation has also been modified by

introducing better and more opaque yellow pigments.

Insufficient Pre-Treatment of Welds and Edges

Treatment (grinding) of weld spatter, weld slag, undercuts and weld porosity must be carried out prior to abrasive blasting. Likewise, all edges must be rounded. If not,

the areas could be starting points for corrosion attacks.

Mounting of New Accessories

Frequently, accessories such as lamps, clamps and the like have to be attached to the finished structures. Sometimes these activities happen offshore. As the mountings are often performed by non-painters



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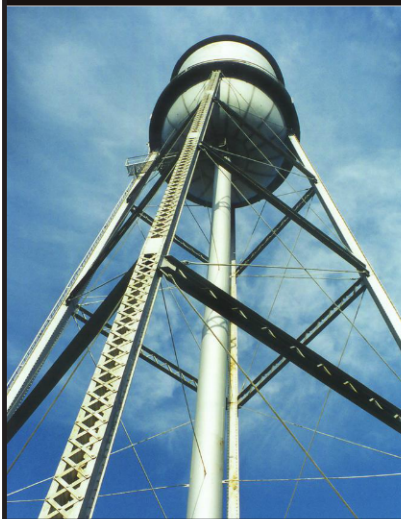
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Quality Corrosion Protection of Offshore Wind Farms

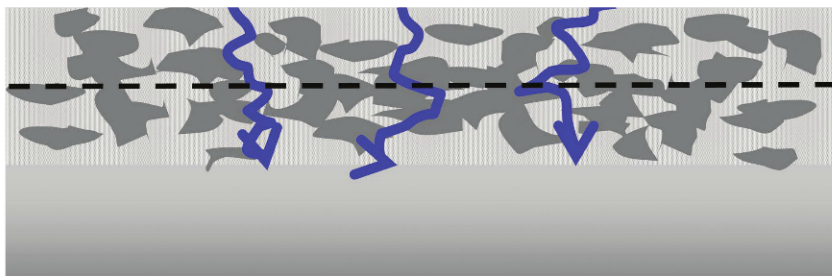


Fig. 3: Poorly ground ceramic extenders combined with a low DFT render a coating film permeable. Photo courtesy of FORCE Technology.

and out of the hand of the main contractor, early corrosion attacks may happen on the structures (Fig. 7).

Flaking

Epoxy and PU paints have a recoat window. If the maximum recoating interval has been infringed upon, the subsequent coat may have adhesion problems. Similarly, a greasy or dusty surface may deter adhesion of the following coat and can result in flaking³ (Fig. 8, p. 32).

Occasionally, flaking has also been observed on hot-dipped-galvanized structures. The primer has detached due to improper preparation of the hot-dipped-galvanized surface prior to application.

Grinding Sparks

When the painted TP is being fitted with appurtenances, hot sparks may be



Fig. 4: This image shows a decommissioned TP from Yttre Stengrund Wind Farm, Baltic Sea, Sweden, after more than 15 years of service. The splash zone area has been attacked by ice, other impacts and general wear. The area above the splash zone is in fairly good condition. The brackish, low-saline water and the cold climate of the Baltic Sea may have contributed to the lesser corrosion. Photo courtesy of FORCE Technology.

generated by grinding and cutting operations. These tiny hot steel grits can settle on adjacent freshly painted surfaces and soon turn rusty. The result is a freckled discoloration of the surface.

Investigation has revealed that the flying grinding particles are often embedded in the topcoats only, and that possible damages are mainly of a cosmetic nature, as the underlying epoxy coats prevent further intrusion. The spotted surfaces can be repaired by abrasive grinding of the topcoat and repainting.

Cracking

When painting the boat-landing constructions, occasionally unacceptably high DFTs are registered on weld assemblies and corners. Total DFTs of more than 2,000 µm (79 mils) have been observed, if the master painter has been inattentive. The high thickness values create inner tensions in the paint film after drying, which may lead to cracking of the coating film down to the steel surface and then to subsequent



Fig. 5: The two-coat epoxy system at 1,000-1,100 µm DFT on the last five of the HR1 TPs has shown good and lasting resistance, apart from damage caused by impact from supply boats, and the protection remains intact today. Photo courtesy of Morten Mortensen, Hempel A/S.



Fig. 7: This image shows an offshore transformer station. Two typical faults in the surface treatment process that initiate corrosion attacks are noted. The red circles show the lack of rounding of edges (chamfering) on part of the steel bar. The blue circle shows a poorly mounted and painted light accessory after installation of the station. The intact ventilation duct on the left side of the photo has been mounted correctly during the manufacture of the station. Photo courtesy of Dong Energy.

corrosion attacks (Fig. 9, p. 32). A careful check of the DFTs is mandatory, especially in these areas.

DRY FILM THICKNESS MEASUREMENTS

In general, control of the DFTs is one of, if not the most important operation in quality control. DFTs that are too lean can cause permeation of moisture and salts and may also create pores in the coating system, and DFTs that are too high may generate cracks. Solvent-containing paints have the greatest tendency to crack due to the risk of solvent entrapment in the paint film during curing.

DFT verifications are carried out as single measurements with magnetic gages, and frequently the number of readings surpasses the recommendations listed in ISO 19840, "Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Measurement of, and acceptance criteria for, the thickness of dry films on rough surfaces." The criteria of acceptance and rejection of the minimum DFT is the often called the 80/20-rule of ISO 19840 (points 1 through 3).

1. The arithmetic mean of all the individual DFTs shall be equal or greater than the nominal DFTs.

2. All individual DFTs shall be equal to or above 80 percent of the nominal DFT.

3. Individual DFTs between 80 percent of the nominal DFT and the nominal DFT are acceptable provided that the number of these measurements is less than 20

percent of the total number of individual measurements taken.

4. All individual DFT values shall be less than or equal to the specified maximum dry film thickness. If it is not specified, see ISO 12944-5⁴.

If the acceptance criteria are used on the specifications in Table 2, the lowest acceptable DFT is $660 \mu\text{m} \times 0.80 = 528$

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Fig. 8: The flaking of the topcoat and the penultimate intermediate coat on this boat landing was caused by aluminum dust originating from an adjacent thermal spray application during construction and from exceeding recoating intervals. Photo courtesy of FORCE Technology.

µm. Such a DFT is still found sufficient for splash zone environments.

Some painting contractors and contractors have modified the standard to a 90/10-rule, whereby the lowest acceptable DFT becomes $660 \mu\text{m} \times 0.90 = 594 \mu\text{m}$.



Fig. 9: Cracks in a coating film caused by inner tensions in the coating film from excessive DFT. Photo courtesy of FORCE Technology.

CONTROL OF PAINTING OPERATIONS

Additional to the DFT checks, proper quality control guidelines encompass checks of the steel surface after abrasive blasting and prior to painting: steel cleanliness, steel and weld conditions and blasting profile. Later in the process, the wet-film thickness and film coherence are checked during paint

application. A final check after drying also involves possible continuity checks and visual appearance. Wind farm projects for German waters are also statutorily checked for proper color (RAL 1023, Traffic Yellow) by color measuring equipment. All observations are registered in daily logs and reports to be submitted later to classification societies.

SUMMARY

Offshore wind farms are protected today with paint systems that are corrosion-resistant after more than 15 years of service. With high probability, the protection will remain effective during the designed 25-to-30-year lifetime of the farm. A three-coat epoxy-polyurethane system with a DFT of 660 µm is the system used on the most vulnerable area, the TP. Effective protection will only be possible with proper quality control, carried out by well-educated painting inspectors, for

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example FROSIO- or ICorr-certified, and with proper documentation of the entire painting operation processes from the bare steel to the finished construction.

ABOUT THE AUTHOR

Peter Kronborg Nielsen has gained a unique expertise within the coating and corrosion protection area during his more than 40 years in the industry. He began his career as a research and development chemist and later was a laboratory and marketing manager for major coating manufacturers such as Hempel and AkzoNobel. Kronborg then continued into the consultancy service as an advisor on surface treatment and corrosion protection.

Kronborg is currently managing all FORCE Technology issues on coatings for the protection of steel structures with an emphasis on offshore wind turbine



farm operations in Northern Europe and Great Britain. He holds a Bachelor of Science degree in chemistry and is a FROSIO-certified inspector Level III. Kronborg is member of the Institute of Corrosion (ICorr) and former president of the Federation of Danish Paint and Lacquer Chemists.

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GREEN COATINGS FROM A GLOBAL PERSPECTIVE

BY DON FUTCH, JOTUN PAINTS, INC.

This article will examine the different restrictions and indicators currently used to classify coatings as "green." It will also take a brief look at the organizations and governmental agencies involved in the classification of these coatings and discuss the processes involved. Finally, the author will propose guidelines for development of a universal standard based on existing commonality that would then have to be accepted by the global sanctioning bodies and users, while overcoming the bureaucratic hurdles and other obstacles and challenges in the way.



Photo courtesy of Jotun Paints, Inc.

WHAT IS A GREEN COATING?

The world consensus on green coatings is that there is *not* a consensus, and this is what causes confusion when projects cross borders or are global in nature. Currently, more and more projects and specifications are international, with specifications being generated globally and materials and labor being sourced worldwide. Standards in China differ greatly from those used in the United States or in the EU. Some countries have no standards at all, some borrow legislation from existing standards and modify pieces, and some districts within these countries restrict many coatings from use.

The most common method of restricting coating use is regulating volatile organic compounds (VOCs) which are emitted from the coating during the application process. However, the method of calculating this value for each coating varies dramatically between countries and can also be theoretical or actual values, both of which usually vary greatly as well.

Coatings, for the purpose of this article, are defined as non-decorative and whose primary use is for asset and corrosion protection. Linings are also discussed and are defined as protecting a substrate, typically metal or concrete, while in an immersed environment. Architectural coatings are

often regulated as well, but are also subject to even more restrictions, governmental oversight and regulations.

CAN LOWER VOC CONTENT MAKE A COATING GREEN?

The most common indicator to determine if a coating is green is VOC content, which is measured in grams per liter. And how is this value calculated? Each batch of the same coating will have a different VOC level. Each color of the same product will have a different VOC level. When a color is tinted using pigments, the liquid dispersed colorants typically add VOCs to the coating as well, sometimes as much as 15 percent. To complicate matters further, VOCs can be measured in a laboratory, but can also be theoretically calculated, which typically produces a lower VOC value.

Another challenge is created because chemists measure or calculate VOCs by different standards. Most global coating manufacturers will publish VOC values on their data sheets for the home country or the local standard for those specific regions. The most common standards that are often used include the following.

European Union SED (Solvent Emissions Directive) 1999/13/EC — Common in maritime coatings and OEM-type projects. Applicator may be subject to annual VOC generation limits as well.

European Union PPD (Paint Products Directive) 2004/42/EC (and including various updates) — Used for smaller-scale projects such as refinishing, as well as architectural coatings, but countries and authorities can choose to implement this directive to SED-type projects if they wish. This method considers a VOC as an

organic compound having a boiling point greater than 250 C (482 F).

Hong Kong has adopted regulations similar to the South Coast Air Quality Management District (SCAQMD) and is co-operating jointly with Guangdong in mainland China to reduce VOC emissions¹. However, Hong Kong is now using EPA Method 24 to calculate VOCs².

China followed, but did not rigorously enforce, EU guidelines until 2015, at which time the country passed a VOC Consumption Tax by the Chinese Ministry of Finance. This tax is based on the VOC content of the coating as measured by EPA Method 24, "Determination of Volatile Organic Compound (VOC) content in Paints, Inks, and Related Coating Products."

South Korea is currently taking steps to improve its relatively high VOC limits as governed by its Air Quality Preservation Law, lowering the allowed limits 10-to-20

percent from their current maximum thresholds. U.S. EPA Method 24 is the primary and most often referred to method for calculating VOC and hazardous air pollutants (HAPs)³.

Consistency and homogeneity are not prevalent traits among these standards. Why? They all measure solvent that turns into vapor. However, they are all mathematical formulas that allow for different exemptions, different fluctuations and variances that create different values for the same result. Some of the conflicting calculation methods include: theoretical versus actual VOC content, mathematical versus experimental testing and extrapolations, exclusions and exceptions that compensate for water, specific solvents or container volume. A VOC standard with a global method of calculation would make understanding the greenness of a coating uniform and consistent.

OTHER GREEN INDICATORS

A coating can have a low VOC level, but still be hazardous to the environment or workers. There are several other factors that can taint an otherwise green coating. These include HAPs, ozone-depleting chemicals, banned chemicals, exempt solvents and heavy metals.

HAPs

HAPs are chemicals in VOCs that are particularly harmful to health and/or the environment. HAPs are regulated in many countries, especially in the U.S. Congress amended the Federal Clean Air Act in 1990 and singled out numerous air pollutants that are known to cause, or may reasonably be anticipated to cause, adverse effects to human health or adverse environmental effects. Almost 200 specific pollutants and chemical groups were initially identified as HAPs and the list has been modified over time. Common

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HAPs include xylene, styrene and toluene. Methyl ethyl ketone (MEK) was on this list until 2005 when the EPA was petitioned by the Ketones Panel of the American Chemistry Council to remove it. A solvent became green overnight. HAPs are often listed separately from VOCs and are considered the second most common indicator of greenness of coatings.

Ozone Depleting Chemicals

Certain hydrocarbons break down when they evaporate from a coating. They are commonly referred to as photochemically reactive solvents or simply reactive solvents. Photochemical reactivity is a measure of to what degree a compound reacts in the atmosphere and contributes to the formation of ozone. The most common photochemically reactive solvents are toluene and xylene. SCAQMD defines photochemically reactive solvents as "any solvent with an aggregate

of more than 20 percent of its total volume composed of chemical compounds classified below, or which exceed any of the following individual percentage composition limitations, referred to the total volume of solvent."

- A combination of hydrocarbons, alcohols, aldehydes, esters, ethers or ketones having an olefinic or cycle-olefinic type of unsaturation: 5 percent.

- A combination of aromatic compounds with eight or more carbon atoms to the molecule except ethyl benzene: 8 percent.

- A combination of ethyl benzene, ketones having branched hydrocarbon structures, trichloroethylene or toluene: 20 percent.

Other solvents are referred to as non-photochemically reactive or nonreactive solvents, as well. Acetone is classified as a solvent with negligible reactivity, meaning that it has no effect on the

deterioration of the ozone layer. MEK is classified as a low reactive solvent, which means it has little effect on the depletion of the ozone layer. Coatings containing non-photochemically reactive solvents are typically considered to be greener than those containing photochemically reactive solvents, but can still pose health, safety and environmental (HSE) risks.

Banned Chemicals

Banned chemicals include chemicals banned or prohibited by countries, air regulatory boards and specific facilities. Some chemicals are banned in certain countries, but permitted in others. This can present a problem when a global manufacturer tries to import a coating into a country where some of its raw materials are banned. In 1976, the Toxic Substances Control Act (TSCA) was created and all existing, approved chemicals were assumed safe and were

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subsequently grandfathered in⁴. In the coatings industry, raw materials that are used to create global coatings often contain chemicals that do not meet TSCA standards or approvals, causing coating manufacturers to alter their global green coating formulations and create new versions for the U.S. market. Considered by the author to be an outdated regulation, the Act can determine the greenness of a coating.

The EPA's Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), which regulates pesticides, applies to antifouling coatings in the marine industry and many chemicals in global antifouling paints are banned from application in the U.S.⁵ However, these coatings can be applied offshore (for instance, in the Bahamas) and then permitted to travel into U.S. waters where the banned substance works as an antifoulant. The greenness of the coating is not altered between country boundaries. So why is a coating green in one country but not in another?

Bisphenol A (BPA) is a component of epoxy resin and a recipient of bad publicity due to health concerns. BPA chemically mimics estrogen in the body and can reportedly affect human development. Ironically, it has been found in the potable water and food-grade linings of major coating companies that are certified as healthy and safe by organizations such as the National Sanitation Foundation (NSF) and the Food and Drug Administration (FDA). Public outcry has effectively killed this chemical as an option for a drinking water or a food-contact lining.

Isocyanates are found in all 100-percent-solids polyurethane coatings, some colorant formulations, and polyurea and polyurethane linings. These linings are considered very green due to their zero-solvent and VOC levels, but their HSE affects can be devastating. Isocyanates are now classified as a carcinogen in animals and potentially in humans, and health concerns from exposure to isocyanates

include difficulty breathing, chronic asthma, sickness and reoccurring dermatitis. In fact, phosgene, a chemical warfare agent, is used in the production of isocyanates. Many people have developed isocyanate sensitivity and are dealing with the health consequences and yet, in most countries these coatings are considered to be green. However, many facilities are

starting to ban isocyanates from being used in their plants or operations, illustrating that HSE standards and regulations can come from the private sector as well as from governmental regulations.

When public perception can determine whether or not a coating or a component of a coating is green or no longer green, the boundaries will remain vague.

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Exempt Solvents

When it was determined that certain chemicals were so prevalent in the coatings industry, and to assure that performance goals could be met in spite of lowering industry VOC levels, the regulatory agencies decided that exceptions to the rules had to be made. In order to allow coatings to perform somewhat effectively while having a minimum impact on the environment, concessions were made to allow certain chemicals to be used, blended, thinned and formulated, and their VOC content would not be considered. Some of the more common chemicals on this list include acetone, parachlorobenzotrifluoride (PCBTF), *tert*-Butyl acetate (TBAC) and *n*-Butyl acetate. The irony here is that the VOC levels in these chemicals are quite high, some in excess of 700 g/l. However, they were chosen because of their other environmentally friendly traits, such as non-photochemical reactivity, or

for their accessibility, such as acetone. Since they were not necessarily chosen because of their performance levels as a coatings component, manufacturers have had to try to force these randomly selected solvents to integrate with their existing coatings or to formulate completely new coatings in order to achieve the required performance levels and application properties. This has led to compromises in coating performance and has forced the industry to move toward higher-solids products which typically require less solvent or solvents that are exempt or above the boiling point of most VOC-calculated methods, such as benzyl alcohol.

In 2016, SCAQMD decided to review the decision they made almost two decades ago to allow TBAC to remain on its exempt solvent list for VOCs in paint and coatings. When TBAC was initially proposed for exempt status by a chemical manufacturing company in 1997, it was

granted an allowance for exemption with the caveat that its long-term health effects would be studied and reviewed over time. Studies in the early 2000s found that there was potential for TBAC to be a carcinogen, and further studies have raised concerns about its toxicity and potential risks to human health. The EPA, however, recently allowed TBAC to be exempt from reporting the VOCs it generates, which reverses a 20-year-old policy. While it appears that TBAC doesn't have a significant negative impact on air quality, it could pose a serious health risk to workers and users of coatings containing it. Should TBAC lose its exempt status, alternative solvents will have to be utilized, which will have a negative financial impact on the coatings industry. It appears that TBAC, once considered the "perfect green solvent," is now under scrutiny to determine if it's really as green as was once promoted.

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Heavy Metals

Lead is a heavy metal that was used for decades as an anti-corrosive pigment in many paints, coatings and linings and its negative health effects are well documented. Lead was paired with another heavy metal, chromium (as lead chromate), and used as a pigment in paints to create bright, rich colors. While phased out of consumer paints in the U.S. in the late 1970s, lead was used in many industrial coatings, primers, military formulations and even in traffic paint up until the early 2000s. In fact, lead and chromates are still used today in several coating types. A few years ago, lead chromate was detected in Chinese imported goods from baby toys to steel trusses. Global public outcry caused China to reconsider the greenness of lead and it regulated the export of lead-based paints and the products coated with them. However, the country has only recently decided to restrict the use of lead-based

paints within its own borders, finally catching up with the rest of the world's perception of lead and its ill effects.

CREATING A GLOBAL STANDARD

In order to create one universal standard, the following steps would have to occur.

Common Ground

The major players involved — industry suppliers, regulatory agencies and HSE experts — would have to find a common ground as a starting point. By agreeing on similarities and standardized methods, the goal of a simplified rule package to calculate, regulate and abide by could be achieved.

Minimize Exceptions

There must always be exceptions, but if they could be standardized and minimized to a handful instead of a plethora, they would be easier to understand

and comply with. Again, input from the industries' major players is critical to developing a plan that is both practical and implementable.

Eliminate Inconsistencies

A single method of VOC calculation and benchmark levels that are factually generated instead of arbitrarily created will give a reason and purpose to a VOC value and to subsequent green certification. Currently, we say 100 g/L or 250 g/L is a level of green coating certification, but there is no scientific basis for these lines drawn in the sand. Is a coating that is 107 g/L really significantly less green than a 99 g/L coating, especially if the calculation method is different?

Create One Global Standard for Greenness

Once uniform methods are developed to calculate VOC content, to identify HAPS,



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and agreements are reached concerning exemptions and banned chemicals — only then can coatings be compared equally.

CONCLUSION

Several acceptable standards and methods for determining the green level of a particular coating or lining do exist. While VOC content has been the benchmark for many years, other chemical traits have been used to improve or diminish greenness levels of a coating. Although several organizations have declared themselves "certifiers of greenness," in actuality these titles are usually self-proclaimed and financially motivated.

Using existing legislation, regulations and methods as a starting point, standardized and uniform test methods could be implemented, and exemptions and bans universally agreed upon and put into place to create a globally accepted method for determining the green level of a coating.

Whether a point system or chromatic color scale is utilized, a simplified, easy-to-understand rating system would provide much clarity to this complex classification.

ABOUT THE AUTHOR



Don Futch has 25 years of experience with paint and coatings. He has been involved in the specification, inspection and coating installation on over 300 tanks of all sizes and configurations. Futch is a NACE-certified Coating Inspector Level 3 and holds bridge and nuclear facility certifications from NACE as well.

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- Following up on previous successful **Young Professionals** programs, this year we will again facilitate several activities geared towards helping students and young professionals find their way in this industry, but also aimed at learning what SSPC can do better for young professionals. So if you have any promising young guns at your company, you can bring them along to benefit from the many professional activities and even training programs. Students receive a **discounted rate**.
- **Committee Meetings**: During our annual conference, all Technical Committees with work in progress will meet to discuss the further development of standards, guidelines and other policies. As an SSPC member you can register to participate on such committees that primarily operate online, but the conference is always a good opportunity to meet the fellow committee members in person — yet another great way to network and learn more about topics that make you tick.
- And last but not least, there will be several **Guest Tours** to allow your family members traveling with you to enjoy the nature, climate and culture of Florida.


This year I especially hope to see many international attendees as our organization further spreads its wings globally. The world gets smaller everyday and whatever developments occur in North America are bound to affect the industry worldwide and vice-versa. This is not just a North American conference anymore.

For conference regulars, I'm looking forward to seeing you again. For those of you who have not yet attended, give it a try. You will not be disappointed.

Be sure to make your travel and hotel-bookings in time as our conference coincides with the popular Gasparilla Pirate Festival in the Tampa Bay area.

I sincerely look forward to seeing you in Tampa soon!

Sincerely Yours,

A handwritten signature in black ink, appearing to read "Gunnar Ackx". The signature is stylized with a large, sweeping loop at the beginning and a smaller loop at the end.

Gunnar Ackx
SSPC President





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SSPC 2017 IN TAMPA:

JAN 30 - FEB 2, 2017 • TAMPA, FL
SSPC 2017
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EVENTS AND AWARDS

SSSPC's Annual Business Meeting and Awards Luncheon, opening and closing receptions, networking meetings and tours for spouses and guests are among the special events planned for SSPC 2017. For further information, visit www.sspc2017.com.

ANNUAL AWARDS LUNCHEON

Monday, January 30,
11:30 a.m. to 1:00 p.m.

SSPC President Gunnar Ackx, SSPC Executive Director Bill Worms, the Board of Governors and your coatings industry peers will gather to honor the 2016 award recipients. The awards to be presented include the following.

SSPC HONORARY LIFE MEMBER AWARD

This honor recognizes extraordinary contribution and long-term activity on behalf of SSPC. To become an Honorary Life Member, an individual must be nominated by a Board of Governors member and approved by two-thirds of the Board. Only one Honorary Life Membership is awarded each year.

JOHN D. KEANE AWARD OF MERIT

Named for SSPC's executive director from 1957 to 1984, this award acknowledges outstanding leadership and significant contribution to the development of the protective coatings industry and to SSPC.

SSPC COATINGS EDUCATION AWARD

This award is presented for significant development and dissemination of educational material and technical information relating to protective coatings and their application.

SSPC TECHNICAL ACHIEVEMENT AWARD

This award recognizes outstanding service, leadership and contribution to the SSPC technical committees.

WOMEN IN COATINGS IMPACT AWARD

Established in 2014, this award recognizes women in the coatings industry who have contributed to creating a positive impact on the culture of the industry.

PRESIDENT'S LECTURE SERIES AWARD

This award is presented to a paper hand-picked by the SSPC President and chosen for the reflection of the coatings industry and profession.

SSPC OUTSTANDING PUBLICATION AWARD

This award is presented annually to the author(s) of the best technical paper or presentation from the SSPC conference or from JPCL that scores the highest in the following categories: clarity of expression and organization; originality of content or presentation; importance to the protective coatings industry; and effectiveness of figures or tables. SSPC selects a panel of judges from SSPC and JPCL to vote on the award.

JPCL EDITORS' AWARDS

The same panel of judges selects the recipients of these awards, which also recognize excellence in technical writing. Winners are selected from a field of more than 100 eligible papers from SSPC 2016 and from JPCL articles published between May 2015 and July 2016. Awards are also based on clarity, originality,

significance to the industry and effective use of illustrations.

SSPC OUTSTANDING CHAPTER AWARDS

SSPC awards an Outstanding North American Chapter and an Outstanding International Chapter each year. Chapters are evaluated on their overall operation and the creativity and quality of the events held each year.

SSPC STRUCTURE AWARDS

The 11th annual Structure Awards will recognize teams of contractors, designers, end users and other personnel for excellence and expertise demonstrated on industrial and commercial coatings projects. The following awards will be presented.

- The William Johnson Award for outstanding achievement demonstrating aesthetic merit in industrial coatings work.

- The E. Crone Knoy Award recognizing outstanding achievement in commercial coatings work.
- The Charles G. Munger Award for an outstanding industrial or commercial project demonstrating longevity of the original coating.
- The George Campbell Award that recognizes a single outstanding achievement in the completion of a difficult or complex industrial coatings project.
- The Military Coatings Award of Excellence for exceptional coatings work performed on U.S. Military ships, structures or facilities.
- The Eric S. Kline Award for outstanding achievement in industrial coatings work performed in a fixed shop facility. The project can be repair work or new construction.

JPCL will feature the Structure Awards recipients in a photo essay in early 2017.

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OPENING CELEBRATIONS

WELCOME RECEPTION

Monday, Jan. 30, 5:30 to 7:30 p.m.

Sponsored by Carboline

Join your friends, colleagues and peers to kick off SSPC 2017 with complimentary food, beverages and entertainment.

EXHIBIT HALL RECEPTION

Tuesday, Jan. 31, 5:00 to 8:00 p.m.

Sponsored by The Sherwin-Williams Company

Don't miss the ribbon cutting at 5:00 p.m. and the opportunity to be among the first to visit the exhibit hall.

MEETINGS AND OTHER EVENTS

ANNUAL BUSINESS MEETING

Monday, Jan. 30, 3:00 to 4:00 p.m.

The annual business meeting has been moved to Monday afternoon, where Executive Director Bill Worms and key members of the SSPC Board of Governors will update the members on the state of the association.

FACILITY OWNERS BREAKFAST AND PEER FORUMS

Tuesday, Jan. 31, 7:30 to 10:00 a.m.

Facility owners are invited to join the SSPC QP-certified contractors at a complimentary breakfast to thank them for their commitment to quality coating projects. Technical discussions will follow breakfast. Facility owners only, please. An RSVP is appreciated.

**RSVP for any of these events by contacting Jim Kunkle, SSPC, at kunkle@sspc.org or 412-281-2331, ext. 2210.*

POSTER SESSION

Tuesday, Jan. 31, 6:00 to 7:00 p.m.;

Wednesday, Feb. 1, 1:00 to 2:00 p.m.

One of SSPC's goals is to bring more young people into the organization. The Poster Session provides a forum for college students and young professionals to participate in the conference by sharing research presentations. This year prizes will be awarded to the 1st, 2nd and 3rd



Photo courtesy of SSPC

place posters. For more information, contact Sara Badami at badami@sspc.org.

MEGA RUST MID-YEAR FOLLOW-UP

Wednesday, Feb. 1, 8:00 a.m. to 12:00 noon

The mid-year follow-up to the Mega Rust 2016 conference, which was held this past June in San Diego, is scheduled to be part of SSPC 2017. This meeting is designed to continue the discussions on key corrosion issues concerning the U.S. Navy enterprise, generate questions and talking points for potential presenters at Mega Rust 2017, discuss the meeting theme and draft the conference agenda. If interested in participating, please email ASNE at megarust@navalengineers.org.

LUNCH WITH EXHIBITORS

Wednesday, Feb. 1, 11:30 a.m. to 1:00 p.m.

Thursday, Feb. 2, 11:30 a.m. to 1:00 p.m.

Sponsored by CoatingsPro

SSPC and sponsors will provide complimentary lunches in the exhibit hall on



Photo courtesy of SSPC

these days. Tickets will be provided in your registration packet.

RISE, SHINE AND RECOVER BREAKFAST

Thursday, Feb. 2, 7:30 to 8:30 a.m.

SSPC will provide a complimentary breakfast buffet for attendees to begin the final day of the conference.

SPOUSE AND GUEST TOURS

TAMPA HISTORY TOUR BY BOAT WITH LUNCH

Tuesday, Jan. 31, 10:30 a.m. to 1:30 p.m.

Learn about how the city of Tampa grew from a Spanish outpost to the fastest-growing city in Florida. The tour will take you step-by-step through the evolution and offer little-known facts about the city that even locals might not know.

\$115 per person. Lunch is included.

CHIHULY COLLECTION

Wednesday, Feb. 1, 9:30 a.m. to 1:30 p.m.

The Chihuly Collection is a permanent collection of world-renowned artist Dale Chihuly's unique artwork in a magnificent 10,000-square-foot setting. This is the first installation of Chihuly art in a building designed especially for it, so that the art and architecture work together to create a visitor experience unlike any other.

\$95 per person.

CLOSING CELEBRATION

EXHIBIT HALL CLOSING BLAST

Thursday, Feb. 2, 1:30 to 3:00 p.m.

One final opportunity for interaction with the exhibitors before the hall closes at 3:00 p.m. Grab a beverage and dessert and get that last bit of vendor information to complete your conference.



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SSPC 2017 IN TAMPA:

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TRAINING AND CERTIFICATION

Registration for all SSPC courses must be done separately from the SSPC 2017 conference registration. The SSPC 2017 training registration form can be found on p. 104. Some courses have prerequisites, which can be found at www.sspc.org/training/training-home.

To register, email or fax a completed training registration form to Nicole Lourette, SSPC member services fulfillment coordinator, at lourette@sspc.org or 412-281-2331, ext. 2204.

FLOOR COATING BASICS (C10)

JAN. 26-27

This course is designed to meet the practical training requirements of SSPC-QP 8 Section 4.4, which require that each job crew chief and each QC manager complete a minimum two-day overview of concrete components, coating and surfacing types, and surface preparation and substrate repair techniques based on SSPC

consensus standard TU 10, "Procedures for Applying Thick Film Coatings and Surfacing Over Concrete Floors." C10 can be taken in place of the first two days of the Concrete Coating Inspector (CCI) program.

CONCRETE COATING INSPECTOR PROGRAM (CCI)

JAN. 26-27 (CCB);

JAN. 26-30 (TECH. LEVEL);

JAN. 26-31 (CERT. LEVEL)

The CCI program provides several different paths to certification, depending on the attendee's current level of experience; these can be found on SSPC's website. Concrete Coating Basics (CCB) provides basic training and is a prerequisite for individuals seeking CCI certification. The objective of the CCI program is to thoroughly train individuals in the inspection of surface preparation and the installation of protective coatings on industrial concrete structures and facilities.

NAVSEA BASIC PAINT INSPECTOR (NBPI)

JAN. 26-30

NBPI is an inspection course developed by Naval Sea Systems Command (NAVSEA) to train coatings inspectors to inspect critical coated areas as defined by U.S. Navy policy documents. These areas include (but are not limited to): cofferdams, decks for aviation and UNREP, chain lockers, underwater hull, bilges, tanks, voids, well deck over-heads and others. This course is especially valuable, as it also provides the technical and practical fundamentals for coating inspection work for any steel structure projects other than ships.

BRIDGE COATINGS INSPECTOR PROGRAM (BCI)

JAN. 26-30 (LEVEL 1);

JAN. 26-31 (LEVEL 2)

The BCI program covers the fundamentals of how to inspect surface preparation and application of protective coatings on

bridge steel. The course covers situations that affect inspection in the field (e.g. containment, field safety hazards, changing weather conditions), as well as the skills required to inspect new bridge steel painted in the shop, in the field or maintenance systems applied in the field.

PROTECTIVE COATINGS INSPECTOR PROGRAM (PCI)

JAN. 26-30 (LEVEL 1);
JAN. 26-31 (LEVEL 2);
FEB. 1 (LEVEL 3 EXAM)

The objective of this program is to thoroughly train individuals in the proper methods of inspecting surface preparation and installation of industrial and marine protective coatings and lining systems on an array of industrial structures and facilities. Candidates should be prepared for an intense and fast-paced week of training with evening homework and study.

PCI Level 1 has no prerequisites, but it is not an entry-level course. C1 is strongly recommended as a prerequisite for the PCI program. Students who pass the Level 1 exam and meet the prerequisites for Level 2 can take the written and hands-on Level 2 certification exams on day six. A passing grade on both exams is required to become a Level 2-certified inspector. PCI Level 3 identifies and awards recognition to individuals who have in-depth knowledge in the inspection of industrial coatings. Those who pass the Level 2 exam and meet the pre-requisites for Level 3 can take the Level 3 exam on day seven.

FUNDAMENTALS OF PROTECTIVE COATINGS (C1)

JAN. 27-31

The C1 course provides an overview for those who are new to the protective coatings industry. It is also an ideal refresher for reviewing the fundamentals of corrosion and the use of coatings as a protective mechanism against corrosion and deterioration of industrial structures.

PLANNING & SPECIFYING INDUSTRIAL PAINTING PROJECTS (C2)

JAN. 27-31

C2 is designed to provide those who understand coating fundamentals with an overview of the principles of planning, awarding and monitoring the quality of new construction or maintenance painting projects. Students will become familiar with tools to develop effective coating projects and play a more active role in managing painting projects to successful completion.

COATING APPLICATION SPECIALIST REFRESHER (CAS REF)

JAN. 28

The CAS Refresher is an overview of surface preparation and application covered in the Body of Knowledge of SSPC-ACS 1/NACE No. 13 Applicator Certification Standard No. 1, Industrial Coating and Lining Application Specialist Qualification and Certification. It covers topics in surface preparation and coating application and is especially designed for employees that are new to the coatings industry.

BRIDGE MAINTENANCE: CONDUCTING COATING ASSESSMENTS (BRIDGE)

JAN. 28-29

This course covers the fundamental inspection skills required to conduct a coating condition assessment of an in-service steel bridge. It provides a wide range of concerns that can affect the condition of the coating and presents a reporting and rating system, enabling the owner to make an educated decision on how to repair the damaged and deteriorated coating. The course also covers the basics of corrosion and coating types and characteristics related to steel bridges.

LEAD PAINT REMOVAL (C3)

JAN. 28-31

The C3 course includes background information on the hazards of lead and other toxic metals, as well as the current legal and regulatory environment. The course

contains specific discussions on protecting workers, compliance with environmental regulations, proper management of waste streams and operations that result in potential exposures to lead and associated control technology. The course also addresses reading specifications and developing programs to effectively control risks to workers, the public, and the environment. It concludes with a discussion of insurance and bonding issues and an introduction to other safety and health issues.

COATING APPLICATION SPECIALIST (CAS)

JAN. 29 (LEVEL 1);
JAN. 29-30 (LEVEL 2)

The CAS certification program is designed to certify individual craft workers who have experience and training in all aspects of hands-on surface preparation and coating application of complex industrial and marine structures. This program consists of written exams only; no formal training is offered during this program.

SELECTION OF COATINGS

JAN. 29

This course covers the skills required to specify and select a coating for a specific structure or environment. It defines the primary function of a coating, the types of substrates that are painted and the challenges of matching a coating to a service environment to properly protect the structure from corrosion.

BASICS OF ESTIMATING INDUSTRIAL PAINTING PROJECTS (EST)

JAN. 29

This course covers the fundamentals of estimating industrial painting job costs including surface area calculations, labor and production rates, and equipment and material requirements.

INSPECTION PLANNING AND DOCUMENTATION (INSPIC PLAN)

JAN. 29-30

This course will teach coatings inspectors how to plan inspections effectively before the work begins and document results of tests and inspections conducted. The training will emphasize carefully reviewing plans and specifications in order

to develop a comprehensive inspection plan, as well as using forms to accurately and legibly document project-specific inspection and test results, non-conforming work, and rework. This course is designed for practicing coating inspectors already familiar with commonly used coating inspection instruments and standards of practice.

DEVELOPING AN EFFECTIVE COATING SPECIFICATION (DEV CTG SPEC)

JAN. 29-31

This course is designed to provide facility owners, coating managers and specification designers with practical guidance and tools to be used in creating competent industrial coatings specifications that better ensure contractor conformance with job requirements. It reviews the concerns that can affect project success, presents a checklist for developing coating specifications and focuses on the technical requirements to consider when preparing specifications for coating work, with an emphasis on steel and concrete industrial and marine structures.

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LEAD PAINT REMOVAL REFRESHER (C5)

JAN. 30

This one-day course provides refresher training for supervisors and competent persons who are responsible for industrial de-leading operations. It includes a review of basic information about lead and its human health hazards; a review and update of relevant EPA regulations and progresses through discussions of 29 CFR 1926.62 and changes in the Respiratory Protection Standard (29 CFR 1910.134); and discussions about emissions control as presented in SSPC-Guide 6.

EVALUATING COMMON COATING CONTRACT CLAUSES (CONTRACT)

JAN. 30

This course will provide a basic overview of the clauses most common to coatings contracts. It follows the outline of a standard construction contract while also teaching students to identify the key provisions that may be missing from contracts they receive.

PROTECTIVE COATINGS INSPECTOR (PCI) WORKSHOP

JAN. 30

This one-day workshop trains individuals in the proper methods and equipment

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for inspecting surface preparation and installation of industrial and marine protective coatings and lining systems on an array of industrial structures and facilities. It was designed as a supplement to students who have completed the PCI online program.

SPRAY APPLICATION PROGRAM (C12)
JAN. 31-FEB. 1

C12 is designed to train and certify marine and industrial applicators to operate airless spray equipment. The course also assesses the skills of applicators who have at least 800 hours applying protective coatings with airless spray.

PROJECT MANAGEMENT FOR THE INDUSTRIAL PAINTING CONTRACTOR (PRO MGMT)
JAN. 31-FEB. 1

This course offers an introduction to project management concepts used on industrial painting projects. Attendees will learn

about generating new business, reviewing contracts, navigating employee relations, and building safety into the job. The second day of this course involves an exam in which participants resolve real-world project management scenarios.

QUALITY CONTROL SUPERVISOR (QCS)
JAN. 31-FEB. 1

The QCS program provides training in quality management for SSPC-certified contractor personnel, Technical Quality Managers (TQM) and inspectors employed by SSPC-QP 5 inspection firms. It gives an overview of the quality management aspects of surface preparation, paint, coatings and inspection operations that a QCS needs to know. It is highly recommended that persons attending the QCS course have recent inspection training or equivalent formal training and some quality control experience.

NAVIGATING NAVSEA STANDARD ITEM 009-32 (00932)

FEB. 1

This course provides attendees with a better understanding of the painting requirements outlined for U.S. Navy surface ships, submarines and aircraft carriers in Standard Item 009-32. It covers the cleanliness, surface preparation, coating application requirements and system application instructions for various Navy vessels. Requirements of referenced standards are also reviewed.

CCI SUPPLEMENT: DETERMINING THE LEVEL OF MOISTURE IN CONCRETE (CCI SUPP)

FEB. 1

This certification course covers the skills required to conduct moisture testing of concrete substrates prior to coating application. It defines and explains the steps for measuring moisture in accordance with



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ASTM Standard Test Methods. Candidates must have taken and passed the Certification Level of SSPC's CCI Program.

INSPECTING CONTAINMENT

FEB. 1

This course covers how to determine what type of containment is necessary from the specification of work and the supplied drawings at the job site. It will discuss the role the inspector plays when inspecting the removal of toxic coatings within these structures.

USING SSPC-PA 2 EFFECTIVELY (PA 2)

FEB. 1

This half-day workshop explains the key highlights of SSPC-PA 2, Measurement of Dry Coating Thickness with Magnetic Gauges. Students will learn to verify the accuracy of a DFT magnetic gauge; measure the DFT of a coating with a Type 1 or Type 2 gauge; and describe and implement

the procedure to determine if the film thickness in a given area conforms to the maximum and minimum levels specified.

PROTECTIVE COATINGS SPECIALIST PROGRAM (PCS)

FEB. 1

The PCS certification program identifies and awards recognition to individuals who have in-depth knowledge of industrial coatings technology. The PCS is SSPC's highest level of certification and demonstrates mastery in assessment of coatings systems, development of coatings specifications, surface preparation and coatings applications, economics of coatings, contract planning and management, coating failure analysis and inspection.

ABRASIVE BLASTING PROGRAM (C7)

FEB. 2-3

C7 is designed for contractor personnel who wish to obtain certification or others who wish to learn about dry abrasive

blast-cleaning of steel. It covers principles of surface preparation, surface cleanliness, surface profile, dust and debris control and abrasives. Students who do not want to receive the C7 certification can receive a certificate of attendance by attending the lecture portion of the training and observing the blaster demonstration.

DOD FUNDING FOR SSPC 2016 COURSES

Under the DoD Corrosion Prevention and Control Program, funding for some of the courses offered at SSPC 2017 featuring GreenCOAT has been provided to train DoD, Army, Navy, Air Force, Marine Corps and Coast Guard personnel. Funding is on a first-come, first-served basis, and only the cost of the course and exam are funded under the contract. Other costs, such as labor, travel and per diem are to be covered by the participant. For more information, contact Jennifer Merck at 877-281-7772, ext. 2221; or merck@sspc.org.

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SSPC 2017 IN TAMPA:

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TECHNICAL PROGRAM

The following presentations and workshops make up the SSPC 2017 technical program. This schedule is current as of press time and is subject to change. Questions about the technical program can be directed to Sara Badami at badami@sspc.org or 412-281-2331, ext. 2208.

MONDAY, JAN. 30

Morning, 8:30 to 10:30 a.m.

Session 1: Protecting Ships and Marine Structures

- "National Shipbuilding Research Program (NSRP) Surface Preparation and Coatings (SP&C) Panel 2017 Update," by Arcino Quiero, Jr., Newport News Shipbuilding; 8:30 to 9:00 a.m.

This presentation is an overview of the NSRP Surface Preparation and Coating (SP&C) Panel's mission to reduce the cost of construction, maintenance and repairs of U.S. Navy ships. It will review the Panel's efforts and a look at some of its implementable works.

- "Partial Blast of Ultra-High-Solids Coatings on Navy Ships," by J. Peter Ault, P.E., Elzly Technology Corporation; 9:00 to 9:30 a.m.

The NSRP SP&C Panel also sponsored a project that aimed to reduce the extent of abrasive blasting to remove aged, ultra-high-solids coatings from tanks and other spaces on Navy ships. This "partial blast" process and its potential cost savings, service life implications, field observations and testing protocols will be discussed.

- "Increased Productivity and Time Reduction Through Paperless Paint Documentation," by Ross Boyd, TruQC LLC; 9:30 to 10:00 a.m.

The presenter will outline the efforts taken to facilitate implementation and execution of paperless paint documentation software in a U.S. Navy RMC shipboard environment. This software incorporates features that leverage electronic data to provide QA/QC representatives with precise documentation and reporting in real time.

- "Novel Structure Modified Fumed Silica Technology Improves Anti-Fouling Performance in Cuprous OXIDE Based Coatings," by Maria Nargiello, Evonik Corporation; 10:00 to 10:30 a.m.

This presentation will address how the use of select, tailor-made structure modified fumed silica technology formulated synergistically with cuprous oxide improves the antifouling behavior and life-cycle performance of antifouling coatings.

Session 2: Workshop

- "Composite Repair Systems — Design & Qualification, Installation, Testing & Inspection," by Davie Peguero, P.E., NRI; 8:30 to 10:00 a.m.

Composites are reinforced coating systems that have many of the application properties of traditional coating systems, with the added ability to provide structural reinforcement at a fraction of the cost of other means of repair. This workshop will provide knowledge of the design, qualification testing requirements and installation process of composite systems.

Session 3: Hot-Dip Galvanizing

- "Common Causes of Premature Coating Failures on Hot Dip Galvanizing," by Michael O'Brien, MARK 10 Resource Group, Inc.; 8:30 to 9:30 a.m.

Based on numerous premature coating failures investigated by the author on hot-dip galvanized (HDG) surfaces during the past 37 years, this presentation will provide attendees with an understanding of the common reasons for coating failures on HDG. The failures discussed include applications in the galvanizing shop and in the field.

- "Lessons Learned for Painting over Hot-Dip Galvanizing," by Kevin Irving, AZZ Galvanizing Services; 9:30 to 10:00 a.m.

This presentation will teach attendees how to successfully paint over HDG steel, discuss the advantages and disadvantages of the different blast medias used for surface prep and identify the surface conditions of the HDG to ensure good adherence of the paint.

- "Clarifying Material Selection: Understanding the Corrosion Mechanisms for Wastewater Clarifier Mechanisms," by Randy Nixon, Corrosion Probe, Inc.; 10:00 to 10:30 a.m.

This presentation will discuss the corrosive conditions in primary and secondary clarifiers, how various process conditions can affect corrosion mechanisms, and how fabrication quality and other details can affect corrosion resistance. Also discussed are the detrimental electrochemical effects of using combinations of these materials, and how they can be minimized.

Afternoon, 1:30 to 4:30 p.m.

Session 1: Waterborne Coatings, Part I

- "Waterborne Alkyds — Combining Oil and Water to Reduce VOC and Solve Coating Performance Challenges," by Jeffrey Arendt, Arkema, Inc.; 1:30 to 2:00 p.m.

This presentation will discuss the recent developments in waterborne alkyd technology, including alkyd emulsions, alkyd dispersions, water-dilutable alkyds

and water-reducible alkyds. The attendee will walk away with an understanding of the history, present state and future direction of alkyd resin technology for coatings.

- "Next Generation Near-to-Zero VOC High-Build Waterborne Coatings," by Justin Rios, The Sherwin-Williams Company; 2:00 to 2:30 p.m.

The presenter will introduce a low-VOC next-generation coating technology that highlights the potential for waterborne coatings by bringing advantages of fast dry, excellent color and gloss retention, easy application and unmatched performance in direct-to-metal, two- and three-coat applications.

- "The Challenge of Balancing Adhesion and Corrosion Resistance in Waterborne Styrenated Acrylic Direct to Metal (DTM) Resins," by Allen Bulick, Engineered Polymer Solutions; 2:30 to 3:00 p.m.

Design of waterborne acrylic and styrenated acrylic resins for metal protection requires balancing a multitude of often competing properties. This presentation will investigate the fundamental mechanisms by which acrylic polymers both adhere to substrates and inhibit corrosion.

- "FEVE Fluoropolymer Coatings for High Performance Waterbased Applications," by Kristen Blankenship, AGC Chemicals Americas; 3:00 to 3:30 p.m.

This presentation will review the performance of several water-based formulations based on FEVE resins, including a 2K water based polyurethane system and a 1K system based on a blend of acrylic and FEVE emulsion. Results of long-term weatherability and corrosion resistance will be reviewed.

- "Introduction to Zero VOC High Performance Waterborne Epoxy Systems in Industrial Protective Coating Application," by Yong Zhang, Olin Corporation; 3:30 to 4:00 p.m.

This presentation will discuss performance details of an experimental waterborne anti-corrosive primer versus a commercial solvent-based primer, as well as clear and pigmented systems for garage floor coating applications.

The range of conditions under which low-VOC systems can be applied and good performance achieved will also be summarized.

- "Complex Inorganic Pigments and How They Can Make Your Waterborne Coatings Better," by David White, Heucotech Ltd.; 4:00 to 4:30 p.m.

As we continue to move towards a solvent-free society, there are two classes of pigments that are more important than ever: complex inorganic pigments and IR reflective pigments. This presentation will help attendees understand the properties of these pigments and how they can help extend the life of waterborne coatings.

Session 2: Project Planning

- "Presenting Effective EH&S Training," by Christopher Lovelace, The Lovelace Group; 1:30 to 2:00 p.m.

The presenter will offer step-by-step approach to environmental, health and safety training that has been used countless times in 39 U.S. states, Canada, Panama and several European countries over the last 30 years.

- "The Right Paint Reduces Project Delays," by James McDonald, Hempel (USA) Inc.; 2:00 to 2:30 p.m.

This presentation will focus on delays that can be reduced by incorporating the right specification, with the right paint or lining system, for the right climatic conditions using qualified and experienced painting contractors.

- "Conceptual Flaws in Corrosion Mitigation Procurement — Optimal vs. Suitable," by Warren Brand, PCS, Chicago Coatings Group; 2:30 to 3:00 p.m.

In many cases, there is a tacit acceptance among owners that coatings must be reapplied far more often than actually required if an optimal system was installed correctly, as opposed to a suitable system installed without any QA/QC. This presentation will help owners understand who is recommending solutions and the motivations of those making the recommendations.

- "Coating Process Tracking Matrix," by Peter Blattner, KTA-Tator, Inc.; 3:00 to 3:30 p.m.

This presentation will describe and demonstrate the use of a simple spreadsheet that can track and monitor the progress of a coating project based on information obtained during work.

- "Contract Negotiation — A Cage Match," by James McDonald, Hempel (USA) Inc.; and Matt Stevenson, ALS Industrial Services; 3:30 to 4:00 p.m.

Negotiating a painting contract can make you feel like you've been through three rounds in a mixed martial arts (MMA) cage match. This presentation will offer some practical tips on how to make your next negotiation more profitable and predictable.

Session 3: Workshop

- "Proper Use of Coatings Inspection Instruments and Visual Guides in the Digital Age," by Matt Fajt, KTA-Tator, Inc.; 1:30 to 4:30 p.m.

This workshop on the use of surface preparation and coating application inspection instrumentation and industry guides will be composed of an orientation to the basics of instrument use, followed by a series of hands-on workshops. Manufacturers' technical representatives will be on hand to assist with proper use of instruments.

Session 4: Oil & Gas

- "Testing and Acceptance of Coatings for Insulated Service," by Michael McLampy, PPG Industries, Inc.; 1:30 to 2:00 p.m.

This presentation will introduce the issue of corrosion under insulation (CUI), which affects owners of refineries, petrochemical facilities and power generation facilities, and provide an overview of a third-party testing process that coating manufacturers and suppliers can use to provide proper evaluations in a standardized method.

- "Composite Piping Repairs Onboard Offshore Platforms," by Thomas Fink, Technofink, LLC; 2:00 to 2:30 p.m.

The presenter will outline the steps for qualification, design and implementation of real composite piping repair cases performed on offshore oil and gas platforms.

- "Transmission Tower Painting," by Curtis Hickcox, PCS, Public Utilities Maintenance, Inc.; and Matthew McCane, PCS, Greenman-Pedersen, Inc.; 2:30 to 3:00 p.m.

This presentation will illustrate transmission tower terminology and discuss typical means and methods of surface preparation, coating application, recommended worker training and other examples used in this industry.

- "Changes in Appearance and Corrosion Protection of Polyurethane Pipeline Coatings During Weathering Exposure," by Stuart Croll, North Dakota State University; 3:00 to 3:30 p.m.

This presentation will discuss changes in gloss and color of aromatic polyurethane protective coatings for steel pipelines tested over six months of accelerated weathering, the changes in corrosion barrier properties of the coatings in the same exposure, and whether corrosion protection by a coating is correlated with changes in its appearance.

- "Corrosion Control of CUI in a Refinery," by Arthur MacKinnon, PPG Industries, Inc.; 3:30 to 4:30 p.m.

This presentation will look at a typical oil refinery and the crude oil feed chain per unit and discuss what equipment is most veritable for CUI due to heat, stress and chemical attack.

TUESDAY, JAN. 31

Morning, 8:30 to 10:00 a.m.

Session 1: Workshop

- "CSI: Coating System Investigations," by Chrissy Stewart, PCS, and Cynthia O'Malley, PCS, KTA-Tator, Inc.; 8:30 to 10:00 a.m.

When a coating system fails, it is important to determine what went wrong to avoid future incidents and to remediate

the situation — similar to solving a crime. This presentation will follow a directed approach to determine what went wrong and who is ultimately at fault, offering many opportunities for audience participation.

Session 2: Wastewater Coating Challenges and Solutions, Part I

- "Penn Avenue Reconditioning: Tight Site & Telecom," by Daniel Zienty, PCS, Short Elliot Hendrickson, Inc.; 8:30 to 9:00 a.m.

The presenter will discuss the planning considerations involved in a recent water tower reconditioning project with a complex size and scope, in which city operations and telecommunication services had to be maintained during the duration of the project.

- "Coating Selection for Wastewater Facilities Using Paint 44," by Robert Murphy, PCS, The Sherwin-Williams Company; 9:00 to 9:30 a.m.

This presentation will outline performance requirements for coatings and linings used on sound concrete substrates in principal service environments in a municipal wastewater treatment facility. It will also discuss the status of the latest revision of SSPC-Paint 44.

- "Ceramic Coatings in Immersion," by Ben Rowland, PCS, Induron Protective Coatings; 9:30 to 10:00 a.m.

Based on its success in the ductile iron wastewater market, ceramic epoxies are being specified and successfully applied on practically every substrate used for immersion service in both the water and wastewater industries. This presentation will explain the key similarities and differences between ceramic and traditional epoxies.

Session 3: Workshop (sponsored by Durability + Design)

- "Building Coating/Water Repellent Selection Workshop Part 1: Advantages and Disadvantages of Specific Brands of Water Repellents," moderated by Kenneth A. Trimber, PCS, KTA-Tator, Inc.; with presenter Al Morris, Prosoco; 8:30 to 10:00 a.m.

In part one of this three-part workshop on selecting water repellents and coatings for exterior concrete and masonry buildings, attributes of specific brands will be presented so that owners, architects and contractors can make better-informed decisions. Two water repellent manufacturers will present the attributes of their materials, including costs and history of use.

Session 4: Environmental, Health and Safety Regulations

• "OSHA's New Silica Standard," by Thomas Enger, Clemco Industries Corp.; 8:30 to 9:00 a.m.

OSHA issued its new silica ruling in 2015, but opponents of this new regulation believe it is not only technologically and economically infeasible, but also unnecessary. The presenter will explain the industrial sources of silica exposure and the occupational illnesses it can cause and compare the current regulation to the new one.

• "Regulatory Update: New and Revised Regulations and Actions Affecting the Coatings Industry," by Alison Kaelin, CQA, ABKaelin, LLC; 9:00 to 9:30 a.m.

This annual presentation will summarize environmental, health and safety issues that may impact SSPC members, including current and expected EPA and OSHA regulatory rulemaking, emphasis programs, enforcement initiatives or other similar topics.

• "Ladder Safety: Protecting Workers from a Complex Hazard," by Stanford Liang, Tetra Tech; 9:30 to 10:00 a.m.

The presenter will illustrate the complexity of ladder hazards and OSHA regulatory requirements and the elements of a program that, by addressing these complexities, will be more effective in controlling worker exposure to these hazards.

Mid-Morning, 10:30 a.m. to 12:30 p.m.

Session 1: Defending Against Corrosion in the Military, Part I

• "Application of STEM Technology to Corrosion Engineering," by Daniel J. Dunmire, Department of Defense Corrosion Policy and Oversight Directorate; 10:30 to 11:30 a.m.

The DoD Corrosion Policy and Oversight Office (CPO) is engaged in applying STEM technology to resolve difficult corrosion problems. This presentation will show how STEM is taught and applied to different population segments and how it can be used to solve problems in the coatings industry.

• "Data-Driven Decisions for Corrosion Prevention and Control in the U.S. Air Force," by Jeffrey Nusser, U.S. Air Force; 11:30 a.m. to 12:00 noon

This presentation will review past, present and desirable future capabilities to collect, analyze and report on corrosion maintenance data with the intent to facilitate data-driven corrosion management decisions.

• "Chemical Agent Resistant Coating (CARC) — How the U.S. Marine Corps Paints Their Tactical Equipment," by Andrew Sheetz, NSWCCD-SSS; 12:00 to 12:30 p.m.

The presenter will review some of the latest revisions to the CARC specifications that have been made over the past two years and provide insight into how the U.S.M.C. is implementing the use of these products with an emphasis on their repair activities.

Session 2: Bridge Painting and Protection

• "Bedevilled Bridges: An Answer to a National Scandal," by Michael O'Donoghue, Ph.D., and Vijay Datta, MS, International Paint LLC; 10:30 to 11:00 a.m.

This presentation will describe the application more than 20 years ago of an innovative coating system for the rehabilitation and lead abatement of a major truss bridge superstructure in Alberta, Canada. Evidence will be provided that shows how



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- "Report of Findings on AASHTO Domestic Scan 15-03 Successful Preservation Practices for Steel Bridge Coatings," by Charles Brown, PCS, Greenman-Pedersen, Inc.; and Paul Vinik, Florida DOT; 11:00 to 11:30 a.m.

This presentation will document the findings and provide effective strategies and other specific information for use by facility owners in their preservation of coating systems for steel structures. These findings will result in substantial cost savings and significant extension of service life.

- "Residual Dye (Lubricant) on Galvanized Fasteners — How Much is Too Much?" by Steven Duke, Florida DOT; and Carly McGee, KTA-Tator, Inc.; 11:30 a.m. to 12:00 noon

This presentation will display the results of a study that is being undertaken to compare the performance of coatings on fasteners with different amounts of residual staining remaining on the surface after cleaning.

- "Characterizing Bulk Porosity of CBPC Coatings on Aggressive Bridge Exposure," by Md Ahsan Sabbir, Florida International University; 12:00 to 12:30 p.m.

Earlier research by the presenter evaluated the performance of chemically bonded phosphate ceramic (CBPC) coatings in aggressive lab and field environments. This presentation will discuss coating degradation mechanisms and CBPC coating durability parameters while assessing the coating by electrochemical analysis.

Session 3: Workshop (sponsored by *Durability + Design*)

- "Building Coating/Water Repellent Selection Workshop Part 2: Advantages

and Disadvantages of Specific Brands of Coatings," moderated by Kenneth A. Trimber, PCS, KTA-Tator, Inc.; with presenters Rick Watson and Larry Mroz, The Sherwin-Williams Company; Chuck Duffin and Ed Telson, Sto Corp.; and John Minerowicz and Jeff Spillane, Benjamin Moore & Company; 10:30 to 12:30 p.m.

In part two of this three-part workshop on selecting water repellents and coatings for exterior concrete and masonry buildings, three coating manufacturers will present the attributes of their materials, including costs and history of use.

Session 4: Concrete Protection Solutions

- "How to Non-Destructively Measure Dry Film Thickness (DFT) on Concrete Substrates," by Joseph Walker and David Barnes, Elcometer Inc.; 10:30 to 11:00 a.m.

This presentation will review the current measurement techniques and the advances in NDT measurement technology and

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explain how to accurately, reliably and confidently measure coatings on concrete according to ASTM D6132 and SSPC-PA 9.

- "Considerations for Concrete Corrosion Control Alternatives," by Fred Goodwin, BASF Construction Chemicals; 11:00 to 11:30 a.m.

This presentation will discuss the basics of concrete, the various alternatives for control of corrosion in reinforced concrete structures and strategies for selection of these alternatives. The pros and cons of each technique will be reviewed as well as the applicability considerations for the life cycle of the structure.

- "Case Study: A Polyaspartic Coating Made a Commercial Bakery Floor Look Really Sweet," by Steven Reinstadtler, Covestro LLC; 11:30 a.m. to 12:00 noon

The Springhouse Country Market and Restaurant has been a local icon for over 40 years, and when the commercial bakery floor needed repair, a seamless epoxy and polyaspartic floor coating system was recommended. This presentation will explain why a multi-coat system was chosen and what the owner hoped to achieve with the new solution.

- "Understanding Crack Repair Alternatives in Concrete," by Warren Brand, PCS, Chicago Coatings Group; 12:00 to 12:30 p.m.

There are a wide variety of crack repair alternatives available to corrosion professionals, ranging from the simplistic to the highly complex. The presenter will review all of the options for crack repair, including crack injection, bond breaking, route and fill and others.

- "Sewer Linings — Commonly Used Systems and Consideration for Increase Reliability of Restoration," by Nick Subotsch, Peerless Industrial Systems; 12:30 to 1:00 p.m.

There are various ways to protect concrete from corrosion in sewerage-related installations. This presentation will provide a simple overview of the common systems in use and their strengths and weaknesses, and introduces a novel approach based on traditional proven practices.

Afternoon, 1:30 to 4:30 p.m.

Session 1: Coating Inspectors' Forum

- "SSPC 2017 Coating Inspectors' Forum," moderated by J. Peter Ault, P.E., PCS, Elzly Technology Corporation; and Christopher Farschon, PCS, Greenman-Pedersen, Inc.; 1:30 to 4:30 p.m.

This year's forum will engage the audience in a conversation about issues impacting inspectors. The interactive format will pose a series of situations for discussion and allow the audience to debate the appropriate response of an inspector. The situations will encompass ethical issues, inspector etiquette, obligations and responsibilities of inspectors and emerging technology issues.

Session 2: Surface Preparation — The Foundation of Every Coating Project

- "Evaluation of Surface Preparation Methods to Remediate Chlorides," by Bobby Meade, Greenman-Pedersen, Inc.; 1:30 to 2:00 p.m.

The Kentucky Transportation Center (KTC) at the University of Kentucky conducted a study to assess the effectiveness of standard surface preparation methods for bridge painting. In this presentation, results will be analyzed to show the effect of chloride distribution on coating performance, the effectiveness of commonly used surface preparation for chloride remediation and where to go from here.

- "Soluble Salt Measurement — Are We Measuring It Correctly?" by Joseph Walker and David Barnes, Elcometer Inc.; 2:00 to 2:30 p.m.

This presentation will discuss the techniques outlined in SSPC-Guide 15, what they are actually measuring, their advantages and disadvantages, and how measurement comparison can be achieved. It will also examine whether these measurement results are actually what is required to maximize corrosion prevention by protective coatings.

- "The Benefits of Steel Grit Blasting and Recycling," by Mark Stewart, ARS Recycling Systems, LLC; 2:30 to 3:00 p.m.

The presenter will explain the potential cost savings, reduced environmental impact and improved blasting performance of using and recycling steel grit during blasting operations.

- "Non-Abrasive Surface Preparation," by David Watson, Cold Jet, LLC; 3:00 to 3:30 p.m.

This presentation will outline the basic concepts of dry ice cleaning, including the benefits of the process and how it can affect production, improve quality and support an environmentally responsible production environment.

- "UHP Water Jetting and Surface Tolerant Coatings in New Building Applications," by Nuno Cipriano, Narus Consultoria; and Joaquim Quintela, Petroleo Brasileiro S.A.; 3:30 to 4:00 p.m.

After about 20 years of research and development, wet surface tolerant coatings are well established, allowing the expansion of waterjetting facilities in both maintenance and new building shipyards. The presenters will share their experiences using ultra high-pressure hydro blasting and wet surface tolerant coatings on several projects around the world.

Session 3: Workshop (sponsored by Durability + Design)

- "Building Coating/Water Repellent Selection Workshop Part 3, Panel Discussion: Selection of Water Repellents and Coatings Based on Building-Specific Needs," moderated by Kenneth A. Trimmer, PCS, KTA-Tator, Inc.; with presenters Al Morris, Prosoco; Rick Watson and Larry Mroz, The Sherwin-Williams Company; Chuck Duffin and Ed Telson, Sto Corp.; and John Minerowicz and Jeff Spillane, Benjamin Moore & Company; 1:30 to 4:30 p.m.

During this third session, water repellent and coating manufacturers will participate in a panel discussion involving specific building scenarios that are both routine and challenging. The manufacturers will discuss the benefits of their product(s) in addressing the needs. Attendees will be

encouraged to ask questions throughout the discussion.

Session 4: Waterborne Coatings, Part II

• "High-Performance Water-Based Coating Enhanced with Nano Vapor Corrosion Inhibitors," by Markus Bieber, Cortec Corporation; 1:30 to 2:00 p.m.

The presenter will discuss how nano vapor corrosion inhibitors (VCIs) work in protective coatings formulations and how they compare to traditional inhibitors in both performance and environmental impact.

• "Liquid Applied Insulation Coatings: From the Lab to the Field," by Nicole Bowman, Tnemec Company, Inc.; 2:00 to 2:30 p.m.

This presentation will examine the various paint technologies associated with liquid-applied insulation coatings, the established test methods for testing the effectiveness of the coatings, and provide test results versus real-world applications and expectations of product performance.

• "Balancing Act: Principles of Design and Formulation for Waterborne Acrylic DTM Coatings," by Dr. Leo Procopio and Laura Vielhauer, The Dow Chemical Company; 2:30 to 3:00 p.m.

The presenters will identify some of the challenges in designing and formulating waterborne acrylic DTM coatings for multiple performance properties and discuss some of the unique solutions that have been devised to break free from the delicate balancing act and the restrictions sometimes placed on achieving high performance.

• "Newly Developed Waterborne Phenalkamine for Corrosion Resistant Primers," by Dr. Hong Xu, Cardolite Corporation; 3:00 to 3:30 p.m.

This presentation will review the performance of a newly developed, cashew nutshell liquid (CNSL)-based waterborne phenalkamine in zero- and ultra-low-emissions protective and industrial coatings formulations.

• "Optimization of Non-Toxic Anti-Corrosives in Waterborne Coatings," by Andrew Thorn, Heucotech Ltd.; 3:30 to 4:30 p.m.

This presentation will review the basics of corrosion, explore different mechanisms of corrosion protection relative to waterborne coatings, discuss the importance of anti-corrosive selection and provide guidance on formulating with non-toxic anti-corrosives.

WEDNESDAY, FEB. 1

Morning, 8:30 to 9:30 a.m.

Session 1: Mini Session

• "Hubble Bubble Rising: A New Beginning, The Better Way," by Carl Reed, CCC&L Inc.; and Michael O'Donoghue, Ph.D., and Vijay Datta, MS, International Paint LLC; 8:30 to 9:30 a.m.

Seven years ago, the presenters questioned much of the conventional wisdom surrounding coating testing, how results

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are interpreted and what it means to the coatings industry. This sequel to that presentation will delve further into the examination, providing an improved pathway to choosing coatings systems for specific end use applications.

Session 2: Mini Session

- "Up Periscope: Hunting for the Scope of Work," by Troy Fraebel and Chuck Fite, The Sherwin Williams Company; 8:30 to 9:30 a.m.

The presenters will provide examples of good and not-so-good scope of work statements and provide guidance for those writing invitations to bid, contract documents and specifications on how to make these documents more friendly to the readers, especially at the bidding stage.

Session 3: Mini Session

- "Maintaining Aged Infrastructure with Difficult to Coat Features," by Allen Skaja, Ph.D., PCS, U.S. Bureau of Reclamation; 8:30 to 9:30 a.m.

This presentation will review common practices for coating aged infrastructure with difficult to coat features such as riveted construction, back-to-back plates or skip welds. It will discuss case histories using modern coatings, specification language and workmanship of contractors.

Session 4: Mini Session: New Developments in Low-VOC Protective Topcoats

- "Environmentally Friendly Protective Coating Systems Using a Waterborne Fluoropolymer Top Coat," by Tsuyosi Matumoto, DAI Nippon Toryo Co., Ltd.; 8:30 to 9:00 a.m.

In this presentation, the performance of newly developed fluoropolymer protective coating systems will be investigated on outdoor exposure tests and laboratory tests and compared with previous solvent-borne fluoropolymer coatings.

- "Novel Crosslinking Isocyanate-Free Coatings Technology," by Sunitha Grandhee, Ph.D., BASF Corporation; 9:00 to 9:30 a.m.

This presentation will describe a novel, isocyanate-free crosslinker based on carbodiimide chemistry that has advantages for anti-corrosion, adhesion, gloss and other performance properties compared to standard epoxy and 2K PU systems.

Mid-Morning, 10:00 a.m. to 12:00 noon

Session 1: Coatings of the Future

- "Hydrophobic Spray Elastomers," by Fabio Aguirre-Vargas, The Dow Chemical Company; 10:00 to 10:30 a.m.

The presenter will demonstrate the role of hydrophobicity in the barrier properties of coatings by comparing the chemical resistance of a fast-cure hydrophobic elastomeric coating against epoxy coatings typically used in chemical resistance applications.

- "Challenging the Performance Myth of Inorganic Zinc-Rich vs. Organic Zinc-Rich Primers," by Antoni Prieto, Hempel Coatings; 10:30 to 11:00 a.m.

This presentation will describe the protection mechanisms of a new generation of zinc-rich primers with enhanced protection versus inorganic zinc-rich primers by reviewing performance properties with real results from different corrosion tests.

- "Extent of Cathodic Disbondment of Nanoparticle Enriched Epoxy Primer in the Presence of a Defect," by Saiada Fuadi Fancy, Florida International University; 11:00 to 11:30 a.m.

This presentation will focus on the influence of nanoparticles on the cathodic disbondment process of zinc rich coating systems using disbondment test results of zinc-rich epoxy nanocoating compared to the conventional zinc rich coating system.

- "Developing Selection Criteria for Field-Applied Pipeline Coatings," by Mike Quinn and David D'Ambrosio, Polyguard; 11:30 a.m. to 12:00 noon

This presentation on field-applied pipeline coatings will provide information from the presenters' over 30 years of experience in the pipeline and corrosion control industry which has involved many coating tests, field exposures and evaluations.

Session 2: Panel Discussion

- "Exploring Differing Views on Causes of Coating Failures," moderated by Dwight Weldon, PCS, Weldon Laboratories, Inc.; with panelists Charles Harvilicz, PCS, Newport News Shipbuilding; Dudley Primeaux, PCS, Primeaux Associates LLC; and Michael O'Brien, MARK 10 Resource Group, Inc.; 10:00 a.m. to 12:00 noon

A panel of coating specialists with experience in analyzing premature coating failures will review the same photos and laboratory data about a specific case, and then, in turn, will explain their views on what happened and why. Each will represent a different party in the dispute — Owner, General Contractor, Painting Contractor and Paint Manufacturer — as the moderator will lead a discussion about the differences in interpretation of the same facts.

Session 3: Defending Against Corrosion in the Military, Part II

- "Importance of Protective Coatings in Preventing Corrosion," by Terry Gabbert, Corrosion Prevention and Control Office; 10:00 to 10:30 a.m.

This presentation will cover considerations that should be taken into account when selecting a coating stack-up, both in initial acquisition and sustainment planning. Additionally, it will provide current references, guidance, processes and efforts that the Air Force will utilize to help emphasize corrosion and reduce total cost.

- "Test and Evaluation of Thermal Spray Nonslip Coatings for Marine Environments," by Patrick Cassidy, Elzly Technology Corporation; 10:30 to 11:00 a.m.

The presenter will review the cost-analysis of longer lasting but possibly much more expensive thermal spray coatings, the desired characteristics of a thermal spray nonslip coating, and how to choose the best candidate alloys for thermal spray nonslip coatings in a marine environment based on laboratory testing.

- "Development of Test Methods for Evaluating Nonskid Performance for the MV-22 Service Environment," by Cameron

Miller, Excet, Inc.; and Colton Spicer, Vision Point Systems, Inc. (VPS); 11:00 to 11:30 a.m.

This presentation will compare the laboratory test results for qualifying high-temperature-resistant nonskid coatings with shipboard observations as well as large-scale, land based testing that is being conducted at Marine Corps Air Station New River under actual MV-22 (Osprey) airframes.

- "The Effectiveness of Energy Efficient Coatings for Military Use," by Dr. Rebekah Wilson and Brooke Divan, M.Sc., U.S. Army Corps of Engineers; 11:30 a.m. to 12:00 noon

This presentation will explain the different ways that the U.S. Army Corps Paint Technology Center tests new coating technology. It will also include a discussion of test performance results of energy efficient coatings.

Session 4: Green Evolution

- "A VOC Free Approach to Surface Tolerant Coatings," by Richard Keeler, Chevron Phillips Chemical Company LP; 10:00 to 11:00 a.m.

The presenter will discuss the field performance of a new solvent-, VOC- and HAPs-free surface tolerant epoxy technology that contains 226 percent (by weight) of plant material, which is considered "bio-content." The discussion will include lab adhesion testing and performance data.

- "VOC Reduction in Epoxy Protective Coatings Using VOC-Exempt Solvents," by Eric Ripplinger, Olin Corporation; 11:00 a.m. to 12:00 noon

This presentation will describe and compare the use of VOC-exempt solvents as one option to replace VOC/HAPs in a one-type epoxy solvent borne coating, as well as the use of a blend of a VOC-exempt solvent with a non-HAPs solvent to replace traditional VOC/HAPs.

Afternoon, 3:00 to 5:00 p.m.

Session 1: Women's Program

- "How to Make Generational Diversity a Business Asset," moderated by Joyce Wright, Newport News Shipbuilding; with presenter Christine Bryant, Covestro LLC; 3:00 to 5:00 p.m.

The moderator and presenter will discuss the intergenerational workplace today and how to focus on similarities instead of just differences between generations. All ages and genders will learn how to make this a business asset and have a chance to hear from professionals from different generations.

Session 2: Workshop

- "Protective Coatings 101," by Charles Brown, PCS, Tony Serdenes, PCS, and Christopher Farschon, PCS, Greenman-Pedersen, Inc.; 3:00 to 5:00 p.m.

This workshop will provide an overview of an industrial protective coatings project,



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including design considerations, material selection, surface preparation guides, ambient conditions and basic quality control techniques. Participants will attain a basic understanding of how protective coatings are specified and applied to meet the goals of a project.

Session 3: Hot Topics in the Marine World

- "Status of High Temperature Resistant Thermal Spray Nonskid Coatings within the U.S. Navy," by John Wegand, U.S. Naval Research Laboratory; 3:00 to 3:30 p.m.

The U.S. Navy has determined that thermal spray coatings can be used as an alternative to traditional epoxy-based nonskid coatings under high temperature applications to extend service life. The presenter will outline benefits of the thermal spray nonskid system and discuss NRL's current programs to optimize this technology.

- "Cathodic Disbondment in Modern Marine Systems," by Edward Lemieux, U.S. Naval Research Laboratory; 3:30 to 4:00 p.m.

This presentation will review the basic principles of cathodic disbondment and typical test procedures with an emphasis on marine applications. Advanced methods, assessment methodologies and unique examples of cathodic disbondment in modern, multi-component and thick polymers will be presented.

- "Measuring Surface Profile of a Waterjetted Surface," by Damien Ranero, NSWCCD-SSES; 4:00 to 4:30 p.m.

Waterjet cleaning does not establish, but may reveal, an existing surface profile on a metallic substrate. This presentation will discuss alternative surface preparation methods to create the required surface profile if the existing surface profile is not acceptable for subsequent coating application.

- "Measuring Surface Profile on Pitted Steel," by Robert Kogler and Laura Erickson, Rampart, LLC; 4:30 to 5:00 p.m.

This presentation will discuss the issue of measuring surface profile on corroded and pitted areas of steel based on results from controlled abrasive blasting research. The presenters will discuss the limitations of conventional quality assurance methods in these situations and propose techniques for surface assessment under such less-than-ideal conditions.

Session 4: Surface Profiles — How Deep Is Too Deep?

- "Anchor Profile Issues for Maintenance Bridge Painting," by Bobby Meade, Greenman-Pedersen, Inc.; 3:00 to 3:30 p.m.

The Kentucky Transportation Cabinet (KYTC) recognizes that there are industry concerns focused on surface profile as more bridges that have been previously abrasive blast-cleaned for maintenance projects are being cleaned again. This presentation will outline these concerns and present solutions for lowering costs while providing the best possible prepared substrate.

- "Too Deep or Too Shallow — Can Surface Profiles be Changed by Additional Blast Cleaning?" by William Corbett, PCS, KTA-Tator, Inc.; 3:30 to 4:00 p.m.

This presentation will describe the potential impact of insufficient/excessive surface profile on production and quality, and will present the results of the research initiative that tested these properties.

- "Avoiding or Resolving Common Problems with Inspectors and Owners Related to Surface Profile on Blasted Steel," by Michael O'Brien, MARK 10 Resource Group, Inc.; 4:00 to 4:30 p.m.

Disagreements regarding surface profile commonly occur on jobsites between coating inspectors and contractors. The presenter will provide recommendations regarding how to proactively avoid surface profile problems prior to starting a project, and give guidance on how to address it if profile related issues develop during the project.

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• "Surface Profile Effects: What We Know, What We Don't Know, What We Should Know," by Carl Reed, CCC&L; 4:30 to 5:00 p.m.

This presentation will examine the effect of surface profile in relation to the performance properties of protective coatings. Properties that are often attributable to surface profile but have little, if any, real relationship will be examined, as well as properties that are currently in need of further study.

THURSDAY, FEB. 2

Morning, 8:30 to 9:30 a.m.

Session 1: Mini Session

• "Past vs. Present — Comparing Laboratory Performance of Vinyl Resin Coatings with Modern Epoxy-Polysiloxane Coating Systems," by David Tordonato, Ph.D., P.E., US Bureau of Reclamation; 8:30 to 9:30 a.m.

The presenter will explain the background of historical vinyl resin coating systems used by the U.S. Bureau of Reclamation and Army Corps of Engineers. He will discuss the current laboratory coating evaluation methods used by USBR and the laboratory performance of vinyl resins in the context of modern coating systems

Session 2: Mini Session

• "To Cycle or not to Cycle: That is the Question," by Carl Reed, CCC&L; and Kat Coronado, International Paint LLC; 8:30 to 9:30 a.m.

The presenters previously examined the futility of attempting to correlate accelerated corrosion testing results to real-world corrosion observations, and how corrosion testing is useful as an indicator of performance without the need for real-world correlation. This third presentation examines the utility of wet/dry cycling testing versus continuous fog methods.

Session 3: Mini Session

• "NASA's Corrosion Technology Laboratory at the Kennedy Space Center: Anticipating, Managing, and Preventing Corrosion," by Luz M. Calle, Ph.D., NASA; 8:30 to 9:30 a.m.

This presentation will provide a historical overview of the role of NASA's Corrosion Technology in anticipating, managing and preventing corrosion. The presenter will also discuss strategies for improved corrosion protection and durability that can have an impact on the economic sustainability of human spaceflight operations.

Mid-Morning, 10:00 a.m. to 12:00 noon

Session 1: Formulating Coatings

• "Estimating Color Fade of PVDF-Based Topcoats for 'Bright Color' Architectural Restoration and Protective Coating Applications," by Kurt Wood, Arkema, Inc.; 10:00 to 10:30 a.m.



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The presenter will help attendees understand the main physical and chemical processes that lead to color fade in "bright color" (high-chroma) coatings in the outdoors and why there is no universal "acceleration factor" that can be used to reliably link hours of exposure in a particular accelerated test with hours of exposure in Florida, irrespective of resin chemistry or pigment grade.

- "New Reactive Diluent to Reduce the VOC Content of Polyurethane Acrylic Coatings," by Christopher Letko, The Dow Chemical Company; 10:30 to 11:00 a.m.

New reactive diluents have been found to increase the overall solids content of acrylic polyurethane (PU) coatings, effectively reducing VOC content. This presentation will show how these additives can be incorporated into acrylic PU coating formulations without diminishing mechanical performance or weatherability.

- "Evaluations of Wetting and Dispersing Additives for Use in Waterborne Anti-Corrosive Paints," by Ronald Brashear, BYK Additives & Instruments; 11:00 to 11:30 a.m.

This presentation is based on a new wetting and dispersing additive based on novel chemical technologies, which allows for improvements in durability, anti-corrosion and adhesion properties of waterborne coatings along with improved processing characteristics.

- "Low VOC Autocatalytic Anti-Corrosion Primers," by William Heaner, The Dow Chemical Company; 11:30 a.m. to 12:00 noon

The presenter will discuss how autocatalytic polyurethane prepolymers can be optimized for low-VOC one-component anti-corrosion primers, how defects such as mud-cracking and bubble-formation can be minimized, how robust coating compatibility and intercoat adhesion can be achieved, and how autocatalytic polyurethane prepolymers can be used in anti-corrosion primers to prime/seal concrete.

Session 2: Workshop

- "Do You Really Know the Consistency of Your Coating Thickness?" by J. Peter Ault, P.E., PCS, Elzly Technology Corporation; and William Corbett, PCS, KTA-Tator, Inc.; 10:00 to 11:00 a.m.

As SSPC-PA 2 has evolved, it is helpful to understand the statistical implications of the measurement process and know what coating thickness variability is reasonable. This presentation will explore how the SSPC-PA 2 standard could be statistically modeled, and will explore the distribution of coating thickness readings on actual industrial structures.

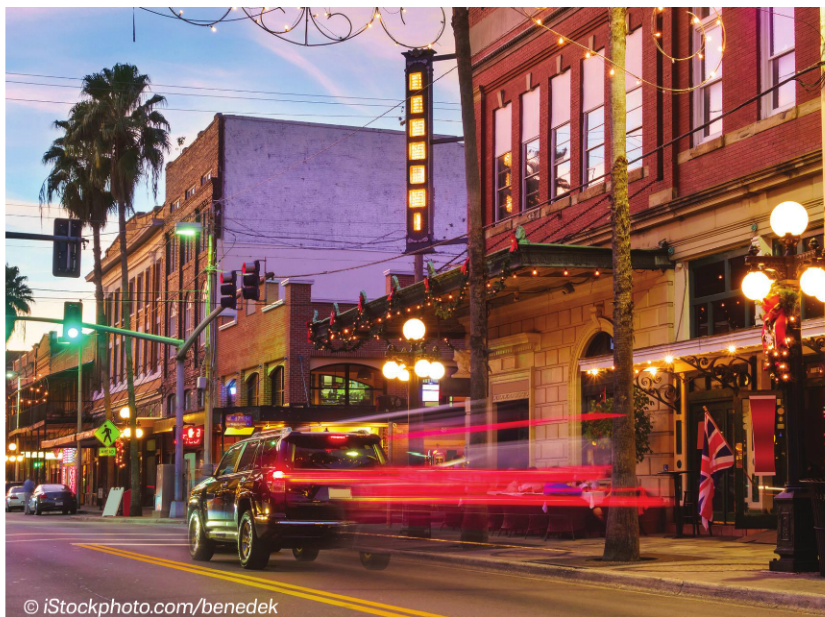
- "DFT Scanning Probe Technology," by Wayne McGauley, Vision Point Systems; 11:00 a.m. to 12:00 noon

This presentation will outline a study currently underway to perform a statistical comparison of results obtained between the traditional non-scanning method and new scanning methods of DFT data collection. Results of this study will be used to develop recommendations for field implementation procedures to take full advantage of this.

Session 3: Workshop

- "Rehabilitation and Strengthening of Concrete, Masonry and Metallic Infrastructure with Fiber-Reinforced Polymers (FRP)," by Ehsan Mahmoudabadi, Ph.D., The University of Arizona; and Ramon Pelaez, PCS, MCI, Greenman-Pedersen, Inc.; 10:00 a.m. to 12:00 noon

This presentation will focus on the current use of FRP in rehabilitation and strengthening of concrete, masonry and steel structures, standardization, contractor certification programs, implementation of process control procedures, QA/QC and worker training.



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Several SSPC committees will hold meetings during SSPC 2017. The following list provides committee names, meeting dates and times. All information is current as of press time. For more details, contact Aimée Beggs, SSPC standards development specialist, at beggs@sspc.org.

MONDAY, JAN. 30

8:30 TO 10:00 A.M.

Standards Review Committee
(Invitation Only)
NSRP Panel

1:30 TO 3:00 P.M.

C.2.0 Surface Preparation Steering
(Invitation Only)
Polymeric Floor Coating Advisory
Committee
Bridge Coating Advisory Committee

3:30 TO 5:00 P.M.

C.1.1 Zinc-Rich Coatings Part 1 (Paint 20,
30 Revisions)
C.1.0 Coatings Steering (Invitation Only)
C.2.11 Profile Measurement Compliance
(PA 17 Revision)

TUESDAY, JAN. 31

8:30 TO 10:00 A.M.

C.2.14 Dehumidification
C.1.1 Zinc-Rich Coatings Part 2 (PS 12.00,
PS 12.01 Revisions)

10:30 A.M. TO 12:30 P.M.

PCCP Open Meeting
C.1.13 Coatings for Water
and Wastewater Facilities
C.2.8 Revision of SSPC-SP 16 (Brush-Off
Blast Cleaning of Non-Ferrous Metals)

1:30 TO 3:00 P.M.

C.7.5 Texture of Concrete Coatings
PCCP Business Meeting (with lunch)
C.1.5.F Prevention of Corrosion
Under Insulation

3:00 TO 5:00 P.M.

C.1.8 Fluoropolymer Coatings
C.2.12 Number/Location of Salt
Measurements

WEDNESDAY, FEB. 1

8:30 TO 10:00 A.M.

Mega Rust Mid-Year Meeting (all a.m.)
C.8 Commercial Group
C.7.7 Revision of SSPC SP-13/NACE No. 6
Surface Preparation of Concrete

10:00 A.M. TO 12:00 NOON

C.8.1 Commercial Cleaning and Painting
C.3.5 Revision of SSPC-QP 1
C.1.7 Powder Coatings

1:30 TO 3:00 P.M.

C.5.3.D Revision of SSPC-QP 2
C.8.2 Commercial Coating Materials
C.8.3 Commercial Flooring

3:30 TO 5:00 P.M.

C.7.3 Surface Preparation
of Concrete (SSPC)
C.1.15 Revision of SSPC-Guide 14
C.8.5 Commercial Contractor Certification

SSPC 2017 IN TAMPA:

COMMITTEE MEETINGS

JAN 30 - FEB 2, 2017 • TAMPA, FL

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THURSDAY, FEB. 2

8:30 TO 10:00 A.M.

C.2.16 Revision of SSPC-AB 3
C.7.6 Revision of SSPC-PA 7
C.4.1 Revision of SSPC-PA 5

10:30 A.M. TO 12:00 NOON

C.7.8 Revision SSPC-TR 5/ICRI 710-D/
NACE 02203
C.2.3 Power Tool Cleaning (Revision
of SSPC-SP 2 and 3)
C.3.11 Estimating Surface Area for
Industrial Coating Projects

1:00 TO 3:00 P.M.

Education Committee and Instructor
Committee

3:00 TO 4:30 P.M.

SRC Wrap-Up Meeting (Invitation Only)



Photo courtesy of Tampa Convention Center.

SSPC 2017 IN TAMPA:

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EXHIBITOR DESCRIPTIONS

The SSPC 2017 exhibit hall will feature 125 companies involved in protective and marine coatings showcasing their products and services. The following is a list of exhibitor descriptions, with booth numbers and contact information known to JPCL at press time. For more information on the SSPC 2017 exhibitors, contact Nicole Lourette at lourette@sspc.org.

Abrasives, Inc. manufactures Black Magic coal slag and Dakota Gold silica sand. Rail access allows the company to deliver abrasives in the U.S. and Canada. Glen Ullin, N.D.; 701-348-3610; abrasivesinc.com. Booth 317. See ads pp. 67 & 88.

Abrasives Manufacturing LLC is an international supplier of steel and stainless steel abrasives to the shot blasting industry. Katy, Texas; 262-349-7821; abrasivesllc.com. Booth 1028.

Air Systems International, manufactured in Chesapeake, Va., provides confined space ventilation, Grade D and E breathing air equipment, and environmental products. The company can customize or design products to safely solve customers' issues. Chesapeake, Va.; 757-424-3967; airsystems.com. Booth 917.

AirTech Spray Systems designs and builds custom spray systems and other industrial spray equipment including industrial sprayers and spray booths for clients around the world. The company has designed industrial sprayers and spray systems for clients in manufacturing, mechanical, transportation and other industrial sectors. Houston, Texas; 713-681-0013; airtechspray.com. Booth 416. See ad p. 74.

Ally Equipment. Denver, Colo.; 888-379-3343; alloyonsite.com. Booth 541.

Ameraguard Protective Coatings supplies polyurea and secondary containment coatings. With over 400 formulas of both pure and hybrid polyurea, it manufactures throughout the commercial, industrial, agriculture and military industries, with custom applications around the globe. Fort Worth, Texas; 866-366-7035; ameraguard.com. Booth 925.

ARID-DRY mobile desiccant dehumidifiers are manufactured by Controlled Dehumidification for temporary humidity control and constructive drying. Features include special filtration, cooling, and heating; units are available in 600-25,000 CFM supply volumes. Brighton, Mich.; 810-229-7900; cdims.com. Booth 526.

ARMEX Blast Media is a line of baking soda based abrasives from Church & Dwight, marketed by The ArmaKleen Company and sold through a network of independent distributors worldwide. ARMEX can be used in industrial service applications and in either dry or wet blast systems. Princeton, N.J.; 800-322-5424; armex.com. Booth 818. See ad p. 71.

ARS Recycling Systems LLC manufactures abrasive grit blasting and recycling systems, as well as dust collection systems. Principal markets served include bridge, marine and storage tank refinishing. ARS systems have an efficiency of 99.6 percent, providing a low operating cost while greatly reducing waste for disposal. Lowellville, Ohio; 330-536-8210; arsrecycling.com. Booth 1132. See ad p. 41.

Atlantic Design, Inc. is a full-service engineering and manufacturing business. With over 30 years of experience, the company sells and rents new and used equipment and can also retrofit, upgrade and troubleshoot customers' equipment. Abingdon, Md.; 410-335-1400; calladi.com. Booth 1140. See ad p. 58.

Axalta Coatings Systems. Houston, Texas; 800-925-0661; axalta.us/powder. Booth 739.

Axxiom Manufacturing, Inc. manufactures the Schmidt brand of engineered abrasive blast equipment and specialized systems that incorporate metering and control systems with quality workmanship. Products include air blast equipment and component parts, as well as vacuum systems, moisture separators, air dryers, after coolers and other storage and transfer systems. Fresno, Texas; 800-231-2085; schmidtabrasiveblasting.com. Booth 723. See ad p. 28.

Barton International supplies high-performance Mil-Spec and CARB-approved garnet abrasives that provide health and environmental safety and performance for a wide variety of applications. Garnet abrasives are harder, heavier and more durable than other blast abrasives and are available in a variety of grades. Glen Falls, N.Y.; 800-741-7756; barton.com. Booth 223. See ad p. 73.

Bellemare Group offers a variety of high-performance abrasive and mineral products. Bellemare's technology enables the company to develop highly specialized products to meet the ever-increasing demands of the industry. Trois-Rivieres, QC, Canada; 819-376-4366; groupebellemare.com. Booth 538. See ad p. 93.

Blast-One International is a specialist product supplier to the protective coating and corrosion control industry. Columbus, Ohio; 800-999-1881; blast-one.com. Booth 837.

Bullard, founded in 1898, manufactures personal protective equipment that is marketed worldwide. Product lines include hard



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Carboline Company offers a global line of high-performance coatings, linings and fireproofing products for steel and concrete protection. For over 60 years, Carboline has combined product development with technical knowledge to create both applicator-friendly and owner-preferred products. St. Louis, Mo.; 314-644-1000; carboline.com. Booth 505. See ad inside front cover.

Carlisle Fluid Technologies (CFT) globally designs and manufactures finishing equipment focused on powder coating, spraying, pumping, mixing, metering and curing of coatings used in the transportation, general industrial, protective coating and other refinishing markets. The company has 375 years of combined experience across its five equipment brands. Scottsdale, Ariz.; 630-237-5169; carlisle.com. Booth 411. See ad p. 39.

CESCO Inc. supplies abrasive blasting, paint spray and safety equipment, as well as the Aqua Miser ultra-high-pressure water blaster. Capable of supplying any type of equipment or supplies necessary to make a coatings project successful, the company combines yesterday's values with tomorrow's innovations. North Charleston, S.C.; 843-760-3000; blastand-paint.com. Booth 341.

The Chemours Company manufactures STARBLAST abrasives. Starke, Fla.; 904-964-1355; chemours.com. Booth 1124.

Chlor*Rid International Inc. supplies soluble salt information, CHLOR*TEST field test kits, soluble salt removal products, the HOLD*BLAST surface passivator and education for surface preparation. Chandler, Ariz.; 480-821-0039; chlor-rid.com. Booth 522. See ad p. 38.

Clemco Industries Corp. manufactures abrasive blast equipment and related

products, including portable blast machines, specialty blast products, operator safety equipment, blast cabinets, recovery systems and blast rooms. Washington, Mo.; 636-239-0300; clemcoindustries.com. Booth 417. See ads pp. 80 & 92.

CoatingsPro Magazine offers an in-depth look at coatings based on case studies, successful business operation, new products, industry news and the safe use of coatings and equipment. San Diego, Calif.; 858-490-2708; coatingspromag.com. Booth 328.

Cold Jet develops innovative, environmentally responsible dry ice cleaning solutions that help companies reduce maintenance costs, enhance product quality, prolong equipment life and improve productivity and worker safety. Loveland, Ohio; 513-831-3211; coldjet.com. Booth 211. See ad p. 95.

Core Industrial LLC is a DBE-certified Women Owned multidiscipline firm offering engineered products and services in the public, municipal, commercial and industrial markets. Services include design and engineering, high-performance abrasives, containment systems, protective paints and coating, custom steel fabrication and rigging supply requirements. Lowellville, Ohio; 844-937-2673; coresales.net. Booth 1029.

Cortec Corporation manufactures environmentally friendly Vapor phase Corrosion Inhibitor (VpCI) and Migrating Corrosion Inhibitor (MCI) technology. Cortec has been awarded more than 50 patents and continues to develop new products for a wide variety of corrosion inhibiting applications. St. Paul, Minn.; 651-429-1100; cortecvci.com. Booth 1004.

Covestro LLC is a supplier of raw materials for the transportation, maintenance, construction, architectural, furniture and industrial finishing markets, including diisocyanates, polyisocyanates, waterborne dispersions, unsaturated polyesters, powder coating raw materials and additives. Pittsburgh, Pa.; 412-413-3983; coatings.covestro.com. Booth 540. See ad p. 69.



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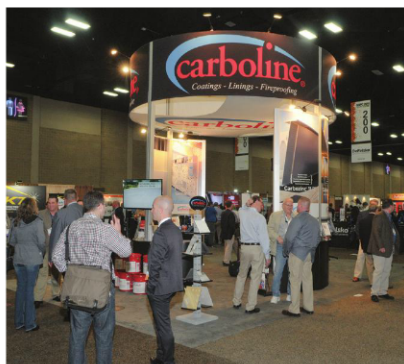


Photo courtesy of SSPC.

CSI Services, Inc. is a third-party, SSPC-QP 5-certified coating inspection firm that provides consulting, inspection and testing services to the coatings industry. Santa Clarita, Calif.; 877-274-2422; csiservices.biz. Booth 715.

Dampney Co. Inc. manufactures industrial and heat resistant coatings for the petrochemical, power generation and OEM markets. Thurmalox is a unique silicone resin technology that allows for ambient or hot applied applications in the industry's most challenging environments. Everett, Mass.; 617-389-2805; dampney.com. Booth 838.

DeFelsko Corporation manufactures PosiTector 6000, PosiTest, and PosiPen coating thickness gages and inspection instruments including surface profile gages, adhesion testers, dew point meters and wall thickness gages. Ogdensburg, N.Y.; 315-393-4450; defelsko.com. Booth 405. See ads pp. 31 & 47.

Dehumidification Technologies, LP provides temporary humidity and temperature control solutions to multiple industries in the U.S., Canada, Australia and Thailand. Owners Ken Armstrong and Brian Battle work closely with employees to deliver customer service. Houston, Texas; 713-939-1166; rentdh.com. Booth 813. See ad p. 40.

Denso North America is a subsidiary of Winn & Coales International, a manufacturer of anti-corrosion coatings, including Protal protective pipeline coatings that can be applied by hand or spray and a full range of fast-cure, high-build epoxies for a variety of above- and below-ground corrosion

protection. Houston, Texas; 281-821-3355; densona.com. Booth 926. See ad p. 33.

DESCO Manufacturing Co., Inc. manufactures dust-free surface preparation tools and critical filtration vacuums designed to remove and contain lead, asbestos, silica and beta hot spot decontamination with minimal secondary engineering controls. Rancho Santa Margarita, Calif.; 800-337-2648; descomfg.com. Booth 717.

Detroit Tarp Inc. has manufactured tarps, covers, and custom enclosures for 49 years. The company will display materials used nationwide for containing lead from abatement projects, overspray, weather enclosures for construction projects and tarps for all needs. Romulus, Mich.; 800-457-5054; detroittarp.com. Booth 619.

Dex-O-Tex, a division of Crossfield Products Corp., develops polymeric and cementitious construction chemistries designed to repair, protect, and beautify commercial, industrial and institutional decks, doors and walls. Rancho Dominguez, Calif.; 310-886-9100; dextotrex.com. Booth 1015.

Department of Defense, Office of Corrosion Policy and Oversight is responsible for development and recommendation of policy and guidance on the prevention and mitigation of corrosion for the DoD's Corrosion Prevention and Control Program. Washington, D.C.; 703-697-0809; corrddefense.org. Booth 1026.

Doosan Portable Power has over 100 years of manufacturing expertise and application experience. Construction equipment includes mobile generators, air compressors, lighting systems, and light compaction equipment. Statesville, N.C.; 704-883-3500; doosanportablepower.com. Booth 1110.

DRYCO provides industrial climate control for the blasting and coating industry, specializing in desiccant and ArcticDRY mechanical dehumidifiers, cooling, heating and temporary power. Downers Grove, Ill.; 866-379-2600; drycogroup.com. Booth 412. See ad p. 43.

Dupont Protection Solutions provides a wide range of protective apparel solutions, including the Tyvek, Tychem and Proshield brands. Richmond, Va.; 804-383-2000; personalprotection.dupont.com. Booth 927.

Eagle Industries services the industrial painting industry with containment and ventilation solutions. Eagle inventories containment tarps, shrink wrap, scaffold sheeting, paint screens, ventilation equipment, surface prep tools, dust collectors, industrial vacuums and more. The company has warehouses on the East, West and Gulf Coasts. New Orleans, La.; 504-733-3510; eagleind.com. Booth 823. See ad p. 16.

Elcometer will showcase and demonstrate its entire line of inspection equipment and software for protective coatings and NDT inspection. Products include corrosion gauges, flaw detectors, adhesion testers, coating thickness gauges, surface profile gauges and climate/humidity gauges.

Rochester, Mich.; 248-650-0500; elcometer.com. Booth 605. See ad p. 3.

EnTech Industries has been manufacturing high-quality, field-tested mobile and skid dust collectors for 20 years. The collectors are offered in diesel, electric and diesel/electric combination, and in capacities from 2,000 CFM through 60,000 cfm. East Grand Forks, Minn.; 218-773-6505; entechindustries.com. Booth 1126. See ad p. 3.

Ervin Industries produces carbon steel and stainless steel metal abrasive sold under the brand names Amasteel and Amacast. Ervin offers application assistance and on-site training. Ann Arbor, Mich.; 734-769-4600; ervinindustries.com. Booth 1023. See ad p. 32.

ESCA Blast, established in 1984, is a turn-key supplier and renter of Graco vapor blasters, sand, dry ice and soda blasters,

and specialty cleaning equipment. All ESCA media is silica- and heavy metal-free. Hatfield, Pa.; 215-723-9000; escablast.com. Booth 809.

Feel Good Inc. is a worldwide distributor of TENS STIMULATORS with over 10 years experience. Its FDA Class II-cleared medical devices use electrical pulses for the stimulation of muscles. Orlando, Fla.; 800-925-0661; feelgoodinc.org. Booth 524.

Fischer Technology provides solutions for the measurement of corrosion protection coatings according to international standards IMO PSPC and SSPC-PA 2. Fischer Dual and Eddy current probes feature a patented conductivity compensation for measuring various aluminum alloys without the readings being affected by the conductivity. Windsor, Conn.; 860-683-0781; fischer-technology.com. Booth 905. See ad p. 81.

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Forrester Environmental Services, Inc. (FESI) provides state-of-the-art, patented FESI-BOND heavy metals stabilization technologies and remedial services in the United States and abroad. Meredith, N.H.; 603-279-3407; fesi-bond.com. Booth 741.

FS Solutions has nearly 100 years of collective experience in industrial vacuum loading, sewer and catch basin cleaning, vacuum excavation and industrial high-pressure water blasting. Elgin, Ill.; 847-622-7044; fs-solutionsgroup.com. Booth 939. See ad p. 92.

GMA Garnet (USA) Corp. supplies garnets for the surface preparation industry. Material is available through the company's global distribution network and warehouses. The Woodlands, Texas; 832-243-9300; garnetsales.com. Booth 904. See ad p. 37.

GMA Industries, Inc. provides virgin and recycled abrasive media for customers' applications. Romulus, Mich.; 734-595-7300; gmaind.com. Booth 1016.

Green Diamond Sand Products offers environmentally safe, moisture-free abrasives with no free silica. Durability and sharp edges provide faster cutting. Custom blends can be used in numerous applications. Riddle, Ore.; 541-874-3111; greendiamondsand.com. Booth 812. See ad p.96.

Greener Blast Technologies offers a surface preparation system using water and blasting materials to be as effective as the conventional methods while using only a fraction of the product. GBT's machine can blast at pressures ranging from 18 to 100 psi. Tyngsboro, Mass.; 978-857-0473; greenerblast.com. Booth 913. See ad back cover.

Greenman-Pedersen, Inc., an engineering and construction services firm, specializes in protective coatings design, management and inspection services for governmental and private clients. Affiliate companies include GPI Southeast, Underwater

Engineering Services and Corrosion Control Consultants & Laboratories. GPI and GPI Southeast are SSPC-QP 5-certified firms. Kentwood, Mich.; 616-940-3112; gpinet.com. Booth 623.

Harsco Minerals has been recycling by-products to minimize landfilling since the 1930s, and producing The Original BLACK BEAUTY abrasives (coal slag) for nearly 80 years. Harsco also offers BLACK BEAUTY IRON (copper slag) and BLACK BEAUTY GLASS (crushed glass) abrasives, utilized in a wide range of applications. Mechanicsburg, Pa.; 888-783-3646; blackbeautyabrasives.com. Booth 615. See ad p. 75.

Hempel coatings are trusted around the world to protect valuable equipment and structures from corrosion. As well as a complete assortment of high-performance coatings, Hempel provides customers with technical service and support to ensure every coating meets their specific needs. Conroe, Texas; 936-523-6000; hempel.us. Booth 817.

HippWrap Containment specializes in shrink-wrap containment enclosures for protective coatings, asbestos and weather protection projects. The company offers creative solutions to containment problems. San Diego, Calif.; 858-530-2015; hippwrap.com. Booth 528. See ad p. 18.

HoldTight Solutions Inc. manufactures HoldTight 102 Salt Remover/Flash Rust Inhibitor. It is non-hazmat and biodegradable and can be dissolved in water to pressure wash any surface, prevent rust and degrease. Houston, Texas; 713-266-9339; holdtight.com. Booth 511. See ad p. 18. See ad p. 85.

HRV Conformance Verification Associates, Inc. provides cost-effective quality assurance inspection services to both public and private entities. Specializing in the bridge and highway construction industry, HRV currently works with numerous DOTs and other authorities throughout the U.S., as well as commercial buildings, water and wastewater, power, oil and gas, rail and transit facilities. Moon Township, Pa.; 412-299-2000; hrvinc.com. Booth 833.

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IBIX Surface Technologies is a family-owned and operated American company, headquartered in Tampa, Florida. IBIX services customers throughout North America, Canada and Mexico with experience, quality and integrity. Its powerful, portable, lightweight one-man systems provide revolutionary technology for surface preparation. IBIX is dedicated to saving the environment for the next generation. Largo, Fla.; 727-322-4611; ibixusa.com. Booth 842.

Indian Valley Industries manufactures containment tarps for lead blast media, dust, overspray and pollution control on waterways, bridges and tanks for any industrial coatings and sandblasting operations. Binghamton, N.Y.; 800-659-5111; ivi-industries.com. Booth 840.

Induron Protective Coatings, Inc. has been a privately held industrial coatings manufacturer since 1947. Induron produces high-performance coatings for markets including water and wastewater, electrical transmission and distribution, pipe linings and general commercial and industrial finishes. Birmingham, Ala.; 205-324-9584; induron.com. Booth 429.

Industrial Vacuum Equipment Corp. manufactures the Hurricane line of industrial vacuum loaders and FiltAire dust collectors. It sells and rents vacuums and dust collectors from locations throughout North America, including Canada. Ixonia, Wisc.; 920-261-1136; industrialvacuum.com. Booth 1116. See ad p. 65.

International Paint/AkzoNobel is a global paints and coatings company and a major producer of specialty chemicals. International and Devoe High Performance Coatings are brands of AkzoNobel, which cater to the needs of oil and gas, power, infrastructure and various other industries. Houston, Texas; 713-682-1711; international-pc.com/northamerica. Booth 422. See ad p. 5.

The International Union of Painters and Allied Trades Finishing Trades Institute (IUPAT/FTI) is committed to providing a workforce that gets the job done on time and on budget. Hanover, Md.; 410-564-5860; finishingtradesinstitute.org. Booth 930.

JAD Equipment Co. Inc. will be showcasing painting, sandblasting, safety, lighting and other inventory used in the blasting and painting industry. The company will also have a few new products. Youngstown, Ohio; 330-746-6100; jadcoua.com. Booth 616. See ad p. 14.

Johnson, Mirmiran & Thompson (JMT) is a multi-disciplined engineering firm that offers a full array of design, construction management and inspection services to clients throughout the U.S. Our client base consists of federal, state and local government agencies, as well as private, commercial and industrial institutions. Pittsburgh, Pa.; 412-375-5100; jmt.com. Booth 325.

Jotun protects property by providing solutions that not only enhance the appearance of your asset but also ensure durability. Its products are designed to meet the latest industry standards and developed with sustainability in mind. Specialties include premium decorative paints and coatings for corrosion protection of metal and passive fire protection of steel. Houston, Texas; 800-229-3538; jotun.com. Booth 316.

Kennametal, Inc. is the North American leader in providing high production abrasive blasting nozzle solutions. It offers a selection of conventional and specialty blast nozzle designs covering a variety of wear-resistant hard materials. Its XL Performance nozzle offers contractors increased productivity gains without additional capital investment. Traverse City, Mich.; 231-946-2100; kennametal.com. Booth 919.

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KTA-Tator, Inc. (KTA) provides facility owners, architects/engineers, contractors, fabricators and manufacturers peace of mind that the integrity of steel and concrete structures and other assets are properly assessed and protected. KTA provides professional consultation and support during any phase of a project: design, construction, post construction or maintenance. Pittsburgh, Pa.; 412-788-1300; kta.com. Booth 805. See ad p. 83.

Luoyang HongFend Abrasives Co., Ltd. (HRAC) is an experienced manufacturer of blasting media in China. Its products include aluminum oxide brown/white in macrogrits or microgrits, alumina-zirconia, general garnet material, waterjet garnet material, glass beads, glass sand, steel shot, steel grit and silicon carbide. Luoyang, China; hongfeng-abrasives.com. Booth 713. See ad p. 96.

MARCO Group specializes in blast cleaning systems, components, and

accessories. Its products are designed to provide maximum productivity and comply with new regulations. Davenport, Iowa; 563-324-2519; marco.us. Booth 705.

MES Rentals is a nationwide equipment rental house geared towards servicing the blast and paint (preservation) market. Its fleet contains dust collectors, vacuums, blast pots, steel grit equipment and more. Spanish Fort, Ala.; 888-281-2643; mesrentals.com. Booth 1104. See ad p. 95.

Minerals Research, Inc. manufactures SHARPSHOT slag abrasives. It also represents and distributes technical abrasives and equipment products, primarily serving California and other Western states. Tucson, Ariz.; 520-837-9289; mineralsresearch.com. Booth 314.

MONTI Tools is the North American office of the MONTI organization, presenting its patented BRISTLE BLASTER industrial surface preparation technology, an easy-to-use,

lightweight, powered tool system capable of cleaning to a near-white finish by blasting away corrosion, mill scale and coatings and generating a profiled finish of 3+ mills. Houston, Texas; 832-623-7970; monti-tools.com. Booth 329. See ad p. 93.

Montipower is showcasing the MBX Bristle Blaster, an innovative power tool surface preparation solution. The Bristle Blaster is ideally suited for spot repairs and for jobs where abrasive blasting is prohibited. Manassas, Va.; 703-396-8777; mbxit.com. Booth 510. See ad p. 59.

NACE International is an authority for corrosion control solutions. NACE's global membership includes engineers, inspectors, technicians, scientists, business owners, CEOs, researchers, educators, students and other corrosion professionals. With offices in the U.S., China, Malaysia, Saudi Arabia, and Brazil, the organization serves all industries impacted by corrosion. Houston, Texas; 281-492-0535; nace.org. Booth 330. See ad inside back cover.

NACE Institute. Houston, Texas; 800-797-6223; naceinstitute.org. Booth 332.

National Equipment Corp. (NECO) will display its NECO Blast Couplings and complete product line. Brenham, Texas; 979-830-8030; hosecoupling.com. Booth 923.

NexTec, Inc./PreTox Systems markets PreTox 2000, a system for rendering lead waste non-hazardous during abatement. The system works with all standard removal methods, including abrasive and mechanical. Dubuque, Iowa; 800-338-8296; pretox.com. Booth 323. See ad p. 30.

Novatek Corp. manufactures surface preparation equipment and portable air filtration systems for hazardous and non-hazardous environments. The Novair air filtration systems are designed to remove hazardous airborne materials. Novatek's surface preparation dust-free tool line contains a comprehensive range of needle scalers, peening prep tools, hand grinders, HEPA filtered vacuums. Phoenixville, Pa.; 610-363-7800; novatekco.com. Booth 729. See ad p. 13.

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Nu Way Industrial Waste Management LLC specializes in hazardous and non-hazardous waste streams in the industrial and commercial sectors. Waste streams include but are not limited to: abrasive media/paint chips, used paints/thinners, dust collector filters, wash/decon water and lead contaminated material. North Lima, Ohio; 234-759-3118; nuwayindustrialwm.com. Booth 1033.

Olimag Sand is the largest producer of non-toxic abrasive for sand blasting in Eastern Canada. Its synthetic olive JETMAG is produced in a rotary kiln at 2,300 F. Thetford Mines, QC, Canada; 418-338-3562; olimag.com. Booth 831.

Oxifree Metal Protection TM198 is a sprayable polymeric resin coating created to prevent metal corrosion resulting from exposure to a variety of elements. Its patented resin contains organic corrosion inhibitors and provides protection against all corrosive contaminants. In addition, Oxifree TM198 contains less than 0.5 percent VOCs. Spring, Texas; 281-251-7171; oxifree.com. Booth 908.

P&L Metalcrafts, LLC offers a full line of rigging supplies at wholesale pricing. It specializes in designing and fabricating complete containment systems for any bridge or water tank. Its complete engineering staff is qualified in every state. Youngstown, Ohio; 330-793-2178; metalcraftsyng.com. Booth 1035.

Pacific Dust Collectors provides equipment rentals and sales and is located on the West Coast. Damascus, Ore.; 503-318-3860; pacificdustequipment.com. Booth 1122.

Paul N Gardner Co., Inc. designs, produces and distributes quality physical testing and inspection instruments for the paint, coatings and related industries. It will be displaying products that measure density, viscosity, coating thickness, adhesion, abrasion, color, gloss, hardness, washability and more. Pompano Beach, Fla.; 954-946-9454; gardco.com. Booth 814. See ad p. 72.

Pinnacle Central Company is a Doosan air compressor distributor and offers new and used equipment sales and a large rental fleet of compressors, generators, manlifts, light towers, blast pots, dust collectors and sand blasting recovery systems.

It also offers parts and service support. Jacksonville, Fla.; 904-354-5746; pinnaclecentral.com. Booth 1108. See ad p. 98.

Polygon provides dehumidification, heating and cooling services and equipment for coating applications. A controlled climate can eliminate condensation, tank surface corrosion and coating failures. North Andover, Mass.; 800-422-6379; polygongroup.com. Booth 613. See ad p. 64.

PPG Protective and Marine Coatings produces coating products to protect assets in some of the world's most demanding conditions and environments. PPG PMC features lines such as the Amercoat, Amerlock, PSX and SIGMA COATINGS brands. Pittsburgh, Pa.; 412-434-3082; ppgpmc.com. Booth 305. See ad p. 9.

Rapid Prep is a full-service provider of steel surface preparation equipment. It rents and sells equipment for all surface preparation applications, including dry abrasive blast machines, grit blast and recycling machines, shot blasters, air dryers, dehumidification and air conditioning equipment, dust collection to 80,000 CFM, vacuums of all sizes and much more. Kingston, R.I.; 877-529-2124; rapidprep.com. Booth 1114. See ad p. 96.

Raven Lining Systems has been providing solutions for corrosion, erosion and I and II in water and wastewater infrastructures for more than 20 years. The technology used has proven to stand the test of time, providing quality and reliability along with a network of trusted certified applicators. Its products are environmentally friendly, 100-percent-solids, zero-VOCs and NSF-certified. Broken Arrow, Okla.; 918-615-0020; ravenlining.com. Booth 912. See ad p. 24.

RBW Enterprises, Inc. manufactures centrifugal shot blast cleaning equipment, specializing in portable systems that can be used both in plant and in the field. It also engineers and manufactures special blast cleaning systems to meet industry needs for surface preparation of pipe, tanks, wind towers and steel plates. Newnan, Ga.; 770-251-8989; rbwe.com. Booth 638. See ad p. 17.

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Ring Power Systems supplies new and used air compressors, air tools and air compressor parts and services throughout Florida. It also supplies many of these same products to include Sullair, Atlas Copco, Hurricane, throughout the United States. St. Augustine, Fla.; 813-671-3700; compressedair.ringpower.com. Booth 1022. See ad p. 97.

Rust-Oleum has provided rust-preventive coatings for over 90 years. Its product lines include industrial and architectural paints, primers and multi-color finishes. Engineered with performance in mind, its products can adhere to a multitude of surfaces and can withstand harsh environments. Vernon Hills, Ill.; 847-367-7700; rustoleum.com. Booth 1031.

SAFE Systems, Inc. provides manufacturing, engineering, sales, parts, technical support and service for its full line of U.S.-built portable equipment and fixed blast facilities. Its standard or custom-designed

equipment for blasting, recovery, classification and dust collection maximizes flexibility and return on investment. Kent, Wash.; 425-251-8662; safesys.com. Booth 517. See ad p. 10.

Safety Lamp of Houston is the North American distributor of Wolf Safety Lamp Co., specializing in portable pneumatic, LED and fluorescent lighting solutions for all wet and hazardous areas. Humble, Texas; 281-964-1019; safetylampofhouston.com. Booth 423. See ad p. 96.

Safway Services, LLC is a manufacturer of engineered suspended access systems for use with bridges, buildings, offshore platforms and special structures. Safway Services sells and rents to contractors. Scotia, N.Y.; 800-558-4772; safway.com. Booth 335. See ad p. 42.

Sand Express produces high-quality processed sands and aggregates. Its

capabilities include raw sands, industrial sands and abrasives. Located in Columbus, Texas, it services industrial and commercial customers throughout the Gulf Coast region and the Central U.S. Columbus, Texas; 800-460-8210; sand-express.com. Booth 1018. See ad p. 94.

Sauereisen Inc. is a corrosion-resistant material manufacturer with a product portfolio that includes a complete line of organic and inorganic corrosion-resistant materials for new and rehabilitation applications. Its manufacturing and warehouse facilities located in the United States, Europe, the Pacific Rim and Latin America provide worldwide product distribution. Pittsburgh, Pa.; 412-963-0303; sauereisen.com. Booth 304.

The Sherwin-Williams Company offers a complete range of products and a dedicated distribution network that delivers on time, every time. Cleveland, Ohio; 216-566-2000; sherwin-williams.com/protective. Booth 733. See ad p. 11.

Sky Climber Access Solutions is a full-service suspended access supplier that offers sales, rentals, service and training. Delaware, Ohio; 855-806-7227; skyclimber.com. Booth 1011.

Specialty Products, Inc. manufactures polyurea and is a GRACO/Gusmer distributor of heated plural component spray applied equipment. Lakewood, Wash.; 253-588-7101 specialty-products.com. Booth 439.

Spider manufactures and distributes access and safety solutions, from basket and suspended platform rental, to rigging service, to safety and training, to specialty engineered products. Seattle, Wash.; 877-774-3370; spiderstaging.com. Booth 541.

Sponge-Jet Inc. manufactures dry, recyclable, low dust and low rebound sponge media abrasives accelerate blasting and painting operations. Sponge-Jet manufactures composite abrasives with bonding conventional abrasives with polyurethane sponge, and manufactures high-production, composite abrasive blasting and recovery systems. Newington, N.H.; 603-610-7950; spongejet.com. Booth 610.





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Strategic Materials. Holmes, Pa.; 215-551-3070; strategicmaterials.com. Booth 922.

Sulzer Mixpac USA, Inc. is a global manufacturer of innovative packaging, dispensing and mixing/spray systems for 2K adhesives, sealants and coatings, including the industry-recognized MIXPAC, QUADRO, MIXCOAT, STATOMIX, MK cartridges/mixers/dispenser guns/spray tips. Salem, N.H.; 603-681-2712; sulzer.com/mixcoat. Booth 909. See ad p. 94.

Tarps Manufacturing, Inc. produces custom containment tarps, building wraps and ground tarps in strong nylon and poly mesh. Many options available in coated fabrics, FR, multi-layered tarps for sound reduction and special printing. Meredosia, Ill.; 217-584-1900; tarpsmfg.com. Booth 929. See ad p. 82.

Technofink offers solutions for high-performance polymers, leak sealing and structural reinforcement in pipes as well as control and protection against corrosion. Houston, Texas; 713-416-8257; technofink.com. Booth 313. See ad p. 54.

Technology Publishing Company has published *JPCL* for over three decades and provides its audience with a daily e-newsletter (*PaintSquare News*) and a digital edition. Its other daily e-newsletter, *D+D News*, focuses on architectural coatings in the built environment. TPC also offers Paint BidTracker, the only project lead service dedicated to coatings work. Pittsburgh, Pa.; 800-837-8303; technologypub.com. Booth 433.

Tesla NanoCoatings is a nanotechnology company based in Ohio with a laboratory at Stark State College. The company features the Teslan product line of corrosion control coatings for structural steel. Teslan was developed in collaboration with the U.S. Army Corps of Engineers Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL). Canton, Ohio; 610-764-1232; teslanano.com. Booth 639.

Tioga Air Heaters is a full-service temporary air heater company. It manufactures a full line of indirect and direct-fired temporary air heaters that are available for rental, lease or purchase. Brooklyn Center, Minn.; 763-525-4000; tiogaairheaters.com. Booth 743. See ad p. 97.

Titan Tool manufactures professional-grade sprayers for applying a variety of coatings and materials, including airless and air-powered sprayers, fine finishing sprayers, sport field and pavement marking sprayers, and sprayers for applying texture, roofing, corrosion control, and protective coatings. Plymouth, Mass.; 763-553-7000; titantool.com. Booth 716. See ad p. 97.

Tnemec Company, Inc. makes high-performance coatings for industrial and architectural applications on steel, concrete, masonry and other substrates. Kansas City, Mo.; 816-486-3400; tnemec.com. Booth 523.

Tractel manufactures a complete range of products including engineered solutions for permanent and temporary access, height safety equipment, material handling and lifting products. Norwood, Mass.; 781-401-3288; tractel.com. Booth 210.

Tronox produces sodium bicarbonate blast-grade media for a variety of sensitive applications requiring gentler surface prep, including automotive, marine and food service. PureBlast is environmentally friendly and has a high production/removal rate. Philadelphia, Pa.; 877-362-2248; alkali.tronox.com. Booth 443. See ad p. 98.

TruQC offers cloud-based documentation for the iPad. Developed by industrial painters for compliance with SSPC-QP and-QS certifications and requirements. TruQC provides customizable solutions for secure job-site documentation, revolutionary documentation storage, improved accounting and time-tracking practices all designed to meet OSHA documentation requirements. Kirkwood, Mo.; 314-457-3920; truqcapp.com. Booth 310.

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U.S. Minerals manufactures coal slag abrasive products from six production facilities. Since 2013, a new copper slag processing facility has served customers throughout the U.S. and Canada. Dyer, Ind.; 219-864-0909; us-minerals.com. Booth 539. See ad p. 29.

Uni-Ram Corp. is a manufacturer of spray gun cleaners and solvent recyclers. Markham, ON, Canada; 800-417-9133; uniram.com. Booth 1017.

The University of Akron's National Center for Education and Research on Corrosion and Materials Performance (NCERCAMP) provides solutions to corrosion and materials performance. Launched in 2010 with a grant from the Department of Defense, the Center is focused on predicting, preventing and managing the nation's destructive corrosion and materials degradation problems. Akron, Ohio; 330-972-2468; uakron.edu/ncercamp. Booth 414.

Van Air Systems is a designer and manufacturer of equipment that dries and purifies compressed air used for applying and removing coating systems. Lake City, Pa.; 814-774-2631; vanairsystems.com. Booth 612. See ad p. 87.

Vector Technologies, Ltd. designs and manufactures the VecLoader industrial vacuum cleaner and cleaning systems, air and hydro vacuum excavators, portable VecLoader vacuum trailer and baghouses, spill response equipment, asbestos and hazardous waste industrial vacuum removal equipment and other products for hazardous and non-hazardous material handling. Milwaukee, Wis.; 414-247-7100; vector-vacuums.com. Booth 1136. See ad p. 19.

VersaFlex Incorporated formulates, manufactures and supplies pure polyurea coatings, liners and sealants for a wide variety of industrial, commercial and maintenance environments. It is a global company with offices in China, Europe, India, Malaysia and the Middle East. Kansas City, Kan.; 913-321-9000; versaflex.com. Booth 519. See ad p. 55.

VitaFlex Soft-Stretch Hoods are innovative PPE to provide complete coverage for the entire head and neck with cool, comfortable

form-fit and effective barrier protection against particles, dust, liquid splashes and paint overspray. Burlington, N.C.; 888-616-8848; vitaflexusastore.com. Booth 427.

VRSim is the leading provider of virtual reality, interactive simulations for the skilled trades market such as SimSpray, which enables organizations to increase the effectiveness of their spray painting and coating education programs. East Hartford, Conn.; 860-893-0080; vrsim.com. Booth 1005.

W Abrasives, a brand of Winoa Group, manufactures high carbon steel shot and grit. Bedford, Va.; 540-586-0856; wabrasives.com. Booth 425.

The Warehouse Rentals & Supplies is a source for quality abrasive blasting and painting equipment and related parts, offering customer service and a large inventory of supplies. Greensburg, Pa.; 724-836-2227; twrs.com. Booth 1128. See ad p. 25.

Wasser Coatings manufactures a full line of high-performance industrial maintenance coatings. Its state-of-the-art product line, solutions and expertise enable compliant applications for every project. Auburn, Wash.; 253-850-2967; wassercoatings.com. Booth 1008.

Western Technology manufactures The BRICK, part of its Kick It Tough line of portable, explosion-proof, low-voltage LED lights. The BRICK and BRICKette can be used in hazardous locations, wet locations and confined spaces with quick mounting. Bremerton, Wash.; 360-917-0080; westerntechnologylights.com. Booth 515.

WIWA LP manufactures airless paint spraying equipment, including standard airless pumps, plural-component equipment and other industrial systems. Alger, Ohio; 419-757-0141; wiwalp.com. Booth 712. See ad p. 51.

Zibo TAA Metal Technology produces steel shot, steel grit, low carbon steel shot, and bearing steel grit blasting products. Its products are widely used for shot/sand blasting, surface cleaning and shot peening processes. Zibo, China; taa.net.cn. Booth 816.