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THE VOICE OF SSPC
VOLUME 35, NUMBER 12 DECEMBER 2018

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The Society for Protective Coatings

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Periodical class postage at Pittsburgh, PA and additional mailing offices. The Journal of Protective Coatings & Linings (ISSN 8755-1985) is published monthly by Technology Publishing Company in cooperation with the SSPC (877-281-7772). FOR SUBSCRIPTIONS CONTACT US AT: Journal of Protective Coatings and Linings, 1501 Reedsdale St., Ste. 2008, Pittsburgh PA 15233-2341; Tel: 1-800-837-8303 (toll free); 412-431-8300 (direct); Fax: 412-431-5428; email: subscriptions@paintsquare.com. Subscription Rates: North America $90 per year; Rest of World $120 per year. Single issue $10.00. POSTMASTER: send address changes to Journal of Protective Coatings and Linings, 1501 Reedsdale St., Ste. 2008, Pittsburgh PA 15233-2341.

PAINT SQUARE

Printed in the USA / www.paintsquare.com

PPG Announces Investment in China Facility, TiO_2 Deal Expansion

Global coatings company PPG announced Nov. 30 that it is investing $1.7 million into a new dispense cell at its Kunshan, China, manufacturing facility.


Getty Images / titoslack

The new cell is expected to be fully operational in the next month, and will increase production flexibility and productivity at the site, according to the company. PPG added that the investment will also deliver cost savings, shortened delivery cycles and reduced emissions.

"Our Kunshan facility is tasked with locally supplying our protective and marine coatings customers in China," said Mike Horton, vice president, protective and marine coatings, Asia Pacific. "This investment will deliver rapid response supply tailored to our protective customers' needs in China. The dispense cell will produce the required quantity and quality of protective coatings product in a matter of minutes in an enclosed process that maximizes environmental performance."

The plant produces protective and marine coatings, and houses the PPG Asia Research and Development Center. It also houses a passive fire protection coatings lab.

That announcement came days after PPG broke news on an expanded, multi-year titanium-dioxide supply agreement with pigment manufacturer Lomon Billions (Jiaozuo City, China) on Nov. 27.

TiO_2 is widely used by PPG in its paints and coatings, acting as a pigment to provide hiding, durability and whiteness characteristics. Lomon Billions manufactures high-performance TiO_2 using both chloride and sulfate processes and has an annual production capacity of more than 700,000 tons.

Under the agreement, Lomon Billions will supply additional quantities of chloride- and sulfate-based TiO_2 to PPG from its existing manufacturing capacity. In addition, PPG has committed to purchasing additional supplies of chloride-based TiO_2 from new manufacturing capacity that is currently being constructed and is expected to be on line in 2019, according to the company.

Financial terms of the agreement were not disclosed.

EPA Sued Over Paint-Stripper Ban

In early November, a group of workers and environment and public health advocates notified the Environmental Protection Agency of its intent to sue the agency over its failure to finalize a ban on the use of methylene chloride in paint strippers.

The group, which is also joined by the mothers of two men who recently died from methylene chloride exposure, says that the EPA has violated its public commitments and legal obligations to finalize the ban.

The group's action refers to the Toxic Substances Control Act, which requires the EPA to regulate chemicals that present an unreasonable risk to human health or the environment. In January 2017, the Obama administration determined that methylene chloride places consumers, workers and bystanders at an unreasonable risk of injury and proposed to ban its use in paint strippers.

In May 2018, the EPA promised to finalize that ban, but it has taken no action since then.

TOP OF THE NEWS

At the time, the EPA said that, as part of its requirement in the switch from the Lautenberg Chemical Safety for the TSCA, it was nearing completion of the Problem Formulations portion of a review of 10 specific chemicals, and has made a decision on methylene chloride.

The update said that the EPA intended to finalize the methylene chloride rulemaking; is not re-evaluating the paint stripping uses of methylene chloride and is relying on its previous risk assessments; and is working to send the finalized rulemaking to the White House Office of Management and Budget shortly

The previous risk assessment that the announcement referred to was the January 2017 determination, when the agency proposed prohibiting the consumer and commercial paint-stripping uses for the chemical. At that time, the EPA said that dangers with regard to methylene chloride include death (due to asphyxiation), liver toxicity, kidney toxicity, reproductive toxicity and certain cancers.

"Some of these health effects result from a very short, acute exposure; others follow years of occupational exposure," the EPA noted.

The 277-page proposal from 2017 called for a prohibition on the manufacture (including import), processing and distribution of these chemicals in commerce. The proposal also talked about restricting the sale of small-volume products and requiring companies to notify retailers and others in the supply chain regarding such prohibitions.

In the absence of action from the EPA, several paint manufacturers and box stores have discontinued the manufacturing or sale of products that contain methylene chloride.

EDITOR'S NOTE

The author of the November *JPCL* article, "Adhesion Testing: How Much is Sufficient?" (Focus On, pp. 11 to 16) has provided the following disclaimer.

As noted, the purpose of the study was to perform a preliminary evaluation of the correlation between lining adhesion and corrosion performance in the laboratory. To that end, no correlation was found between adhesion and undercutting resistance. The study was not designed to compare or evaluate a lining's fitness for purpose and results should not be construed as such.

PAINTSQUARE COMMENTS

In response to "OSHA Reveals Top Violations for 2018" *PaintSquare News*, Nov. 8

Patrick Kapust, deputy director of the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs, recently announced the top 10 violations cited on jobsites in 2018. Like the 2016 and 2017 Top 10 OSHA violation reports, the top five positions have remained the same. Fall protection—general requirements continues to be the most-cited violation, while personal protective and lifesaving equipment—eye and face protection cracked the top 10 for the first time this year.

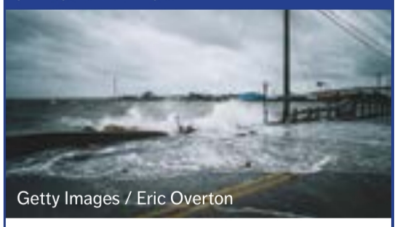
Getty Images / Designer491

Michael Halliwell:
"Man alive, what an utterly sad comment: 'Like the 2016 and 2017 Top 10 OSHA violation reports, the top five positions have remained the same.' Fall protection and RPE in the top five yet again. I guess we still have too many folks for whom 'it'll only take a second' is worth the risk of never coming home again. There are also too many who figure they are safe unless they get knocked down then and there by what's in the air (in spite of the fact the occupational lung disease is still the number one killer of workers long-term ... my local workplace health and safety publication is full of obituaries, of which 95-plus-percent are related to occupational exposures that could have been mitigated by proper RPE, [such as] asbestosis, mesothelioma, silicosis, chronic solvent exposures and so on). I think more folks need to live by the skydiving mantra of 'if in doubt, whip it out.' It's better to wear the PPE and be overly safe, than not and be dead."

Tony Rangus:
"I agree, utterly sad comment. I live in a very rural area in the mountains of Idaho. Like Boise, we are seeing a housing boom. When I meet men and women who comment [that] they are doing home building, I always ask [if] when they are working off-grade, whether they are tied-off [or not]. Sadly, so far, 100 percent say 'no' and offer some pretty lame excuses. The lamest occurred three days ago. Standing in line at our small grocery store, a young man commented how he was working on a roof which was covered in ice and frost. I asked if he was tied-off. After a look of severe indignation, he said, 'hell no.' I asked why, and his response was that he had seen too many workers being tied-off who slipped and the safety rope got wrapped around their necks and they hung themselves. I was startled by the response. I wonder how many times this has actually happened. My feeling is these folks do not want to take the time or spend the money on safety gear, or be laughed at by others."

Tom Schwerdt:
"Tony – that story sounds an awful lot like the 'justifications' for not wearing a seat belt. 'In a wreck, I want to be thrown free!' Sad."

PAINT POLL
paintqsuare.com/poll


Getty Images / Eric Overton

Late last week, the U.S. Army Corps of Engineers gave a nod of approval to a $31B, 70-mile-long coastal barrier that would help protect Texas against future storm surges. Do you think these measures will be enough?

No.	84%
Yes.	14%
Other.	2%

Bryant Chandler:
"[It would] be interesting to have a poll on whether to use the $31 billion for a coastal barrier or for a border crossing fence."

PAINTSQUARE NEWS TOP 10 paintsquare.com/news, Nov. 5–Dec. 2

1. **Government Agency Awards Border Wall Contract**
2. **EPA to be Sued Over Paint-Stripper Ban**
3. **Lawsuit Dismantles IA Wind Turbines**
4. **Delhi's New Bridge Attracts Dangerous Behavior**
5. **Report: Design Flaws Found in FIU Bridge Design**
6. **Boring Company Tunnel Project Abandoned**
7. **OSHA Reveals Top Violations for 2018**
8. **PPG Announces TiO2 Deal Expansion**
9. **$491 Million in Border Wall Contracts Awarded**
10. **Skanska Confirms Exit from US P3 Projects**

The REALLY Premature Coating Failure

BY ROB LANTERMAN, PCS, KTA-TATOR, INC.

During the construction of a natural gas compressor station, structural steel and large- (6 inches and up) and small-diameter (less than 6-inch) piping and associated fittings, flanges and valves, were fabricated and primed before being shipped and stored in a lay-down area at the jobsite, wheere they were to be abrasive blast-cleaned and shop-coated with a high-performance three-coat system before erection and field touch-up. Prior to and during erection, a cursory inspection revealed that the coatings were already exhibiting failure and the substrate was corroding.

Obviously concerned, since the coating system was designed for a minimum service life of 10 years, the owner and the construction management firm requested an independent investigation to determine whether the coating work had been done according to specification. Installation of the piping was not entirely complete at the time of the investigation, and some sections remained in the lay-down area. A second coating contractor was performing field coating work during and after installation and was present at the time of the site investigation.

Fig. 1: Piping and structural steel were stored in a lay-down area prior to erection. Photos courtesy of KTA-Tator, Inc.

THE PROJECT SPECIFICATION

One of the first steps in any coating failure investigation is to determine what was supposed to be done — information typically found in the project specification. The coating specification required surface preparation in accordance with SSPC-SP 10, "Near White Blast Cleaning," followed by the three-coat system application. The primer and the intermediate coat were to consist of an epoxy, applied at 2.5 mils and 4.5 mils dry film thickness (DFT) per coat, respectively, followed by a polyurethane topcoat applied at 2.0 mils DFT. The total specified minimum thickness was 9 mils.

ON-SITE INVESTIGATION

Once what should have been done according to the specification has been established, the next step is to determine what was done. Because background information rarely reveals the entire story of what occurred during project execution, and because no documentation (such as daily inspection reports) of the shop-coating process was available, an on-site investigation was conducted to establish what processes or procedures were performed. The following examinations and tests were performed by the investigator.

Visual Examination and Digital Photography: A visual assessment of the quantity and distribution of disbonding and other visible deterioration on the coated surfaces was performed, and digital photographs of typical conditions were obtained.

Fig. 2: Piping (left) and structural steel (right) coated with a tan-colored topcoat.

Fig. 3: Mechanical damage was evident on piping, flanges and structural steel after erection

Coating Thickness: The thickness of the coating system was measured using an electronic coating thickness gauge in accordance with ASTM D7091. The number of paint layers and thickness of each was also measured per ASTM D4138 and from paint samples examined using digital microscopy in the laboratory.

Coating Adhesion: The adhesion of the coating system was evaluated in accordance with Method A (X-cut) of ASTM D3359, which involved making two intersecting cuts through the coating to the substrate with the smaller angle of the cuts between 30 and 45 degrees. A special pressure-sensitive tape was applied to the X-cut area and rapidly removed. The adhesion was rated on a scale from 5 to 0. Ratings of 4A to 5A are typically considered good adhesion; 2A to 3A represent fair adhesion; and 0A to 1A represent poor adhesion.

Coating Samples: Samples of the coating system were taken on the structural steel, as well as the large and small diameter piping for laboratory analysis.

RESULTS

Visual Examination

The overall appearance of the shop-applied coating on the structural steel and large-diameter piping was good. As is common with shop-painted and field-erected steel, there were some localized areas where the coating had been damaged, some of which were exhibiting rusting. The damage was minor and appeared to be the result of nicks, scratches, scrapes and gouges that occurred during shipping, handling and the erection process. Widely scattered areas of pinpoint corrosion were observed on a few isolated pieces, and a couple of localized areas of rusted skips and misses on welds were observed.

The overall appearance of the field-applied coating on the small-diameter piping and on flanges, valves and appurtenances was in fair-to-poor condition. There were numerous missed areas, as well as areas where a field-applied tan coat was applied over rusted substrate. The tan coat appeared to have been applied directly over the original equipment manufacturer's (OEM's) standard shop-applied primer coat. There was no evidence that the specified abrasive blast-cleaning had been performed prior to the field application of the tan coat.

DFT Measurements and Number of Coats

Coating thickness measurements were acquired from random locations throughout the structural steel and large-diameter piping. The total system thickness ranged from 1 to 18 mils, with an average of approximately 5 mils.

Destructive coating thickness measurement revealed a single coat of tan paint that ranged from 1 to 14 mils, with an average of 4.3 mils. Only three test areas contained a white primer beneath the tan topcoat, with a thickness ranging from 2.5 to 5 mils, followed by the tan

Fig. 4 (Clockwise from left): Pinpoint corrosion was observed on the piping, structural steel and flanges. Note that these surfaces were not abrasive blast-cleaned.

topcoat ranging from 2.5 to 6 mils.

Adhesion Testing

Adhesion of the shop-applied coatings was consistently rated as 5A (good). The evaluation process did not remove any of the shop-applied coating from the underlying steel surface. In fact, it took considerable manual pressure with the blade of the razor knife to even detach small chips of coating at the intersection of the X-cut after the tape adhesion test was performed.

In contrast, adhesion of the field-applied coating varied, ranging from 2A (fair) to 4A (good).

Substrate Examination

The steel substrate beneath the shop-applied coating on large-diameter piping and structural steel was clean (no visible rust or

Fig. 5: Chemical stripper was used to remove coatings from shop-coated pipe and I-beam samples.

mill scale) and displayed a texture typical of a surface that had been abrasive blast-cleaned.

The small-diameter pipe and associated items had various colored OEM coatings present beneath the tan coating, indicating that those surfaces were not blast-cleaned prior to application of the tan coating. The cleanliness of the substrate beneath the OEM coatings was not examined, since that surface was already determined to be non-compliant with the project specifications (i.e., no field blast-cleaning appeared to have been performed to remove the OEM coating).

LABORATORY INVESTIGATION

Several representative coating samples were obtained during the field visit, including cut-out sections from the structural steel and large-diameter pipe. Field samples were analyzed by a laboratory specializing in forensic coating analysis.

Infrared spectroscopic analysis was performed to determine the generic type of coatings applied. The analysis revealed epoxy-based coating materials. There was no forensic evidence of the specified polyurethane finish coat.

Microscopic examination was conducted using a digital microscope with 200-times magnification. All samples contained only one layer of coating.

Chemical paint stripper was applied to remove the coating from two cut-out sections so that the underlying steel substrate could be examined. Visual inspection of the stripped areas revealed clean, roughened surfaces that appeared similar to the abrasive blast-cleaned steel beneath the tan coating layer.

SUMMARY

The following summarizes the field and laboratory investigations and compares the results to the project specification.

Examination of the substrate on the small-diameter piping, as well as the fittings, flanges and valves had various colored

coatings beneath the tan coating that appeared to be OEM coatings. These surfaces were reportedly painted in the field. They did not appear to have been abrasive blast-cleaned prior to application of the tan coating, as was specified.

For the large- and small-diameter pipework, the specification required a three-coat system consisting of an epoxy primer coat (2.5 mils), a high-build epoxy intermediate coat (4.5 mils) and a polyurethane topcoat (2.0 mils), for a total cumulative thickness of 9 mils. Approximately 150 nondestructive coating thickness measurements were taken during the site visit. The average of all measurements was 5 mils, with range of 1 mil to 18 mils. Approximately 90 percent of the readings were below the specified cumulative thickness of 9 mils.

Microscopic examination of the cross-sections in the laboratory revealed a single tan coating. Examination of the structural steel and large-diameter piping in the field using a destructive gage also revealed only one layer of tan coating, except three test areas that contained a white primer beneath the tan coating. Destructive cross-sectional examination on the small-diameter piping, fittings, flanges and valves revealed one layer of tan coating applied over the various-colored OEM coatings.

Infrared spectroscopic analysis of the samples revealed an epoxy coating; there was no polyurethane coating present.

RECOMMENDATIONS

Given that the structural steel and large-diameter piping was never prepared or coated according to the governing specification, the owner could require complete removal of the existing shop-applied coating system by abrasive blast-cleaning to SSPC-SP 10, followed by the application of the coating system at the specified thickness.

Alternatively, a repair procedure was recommended in case field blast-cleaning was not desirable. It was also recommended that the coating manufacturer be contacted to provide a written repair procedure since the maximum recoat time for their product had been exceeded. A typical repair procedure for overcoating

an epoxy that has exceeded the maximum recoat time can entail pressure washing to remove surface dust, dirt, chalking and other contaminants followed by roughening and dulling the gloss of the existing topcoat surface to promote adhesion. Subsequent application of either a polyurethane finish coat or an epoxy intermediate coat with a polyurethane finish coat to the prepared surface was recommended. Also, an epoxy penetrating sealer may be applied as a tie-coat between the existing older coating and the new repainted coating products because they have good surface wetting and adhesion characteristics over existing coatings that have exceeded the maximum recoat time.

It was also recommended that the procedure address the methods to spot-repair the isolated areas where the coating was damaged during the shipping, handling and erection process. Such repair work on previously blast-cleaned steel typically involves spot-power-tool cleaning in accordance with SSPC-SP II, "Power Tool Cleaning to Bare Metal," followed by feathering of the edges to provide a smooth transition from the repair area into the existing coating film.

Overall, the coatings applied to the small-diameter piping, fittings, flanges and valves were in fair to poor condition. The fitting, flange and valve manufacturer's standard shop primers were not removed by blast-cleaning prior to field applying the tan-colored epoxy coating, there was no evidence of a polyurethane topcoat, and there were numerous missed areas and areas where the tan-colored epoxy coat was applied over rust.

Accordingly, it was recommended that the small-diameter piping and associated items be prepared and coated in accordance with the project specification (blast-cleaned to SSPC-SP 10, followed by two coats of expoxy and one polyurethane finish coat). Thorough protection of adjacent painted surfaces to prevent damage from abrasive blast-cleaning as well as overspray during repainting work was also recommended.

ABOUT THE AUTHOR

Rob Lanterman is a coatings consultant with KTA-Tator, Inc. He is an SSPC-certified Protective Coatings Specialist and a NACE-certified Level III Coating Inspector with 20 years of coatings engineering experience.

Getty Images / EtiAmmos

BERYLLIUM AND SILICA IN 2019

BY ALISON B. KAELIN, ABKAELIN LLC

Keeping up with the changes and twists and turns in the beryllium standard can be exhausting. The regulatory landscape for this standard has shifted more than any regulation I've been associated with. Final rules for the General Industry, Construction and Shipyard standards were issued by the Obama Administration on January 9, 2017. Since then, OSHA has issued various proposed rules, direct rules and notices of proposed rules related to beryllium. The following is my assessment of where things stand.

Despite the many stops and starts, rule revisions and enforcement delays, the OSHA Beryllium standard for General Industry is partially in effect and will be enforced beginning January 2019, with requirements for hygiene, housekeeping, change areas and showers going into effect in March 2019. The standards for Construction and Shipyards are in effect and being enforced on a limited basis.

OSHA stated that it would begin full enforcement of the General Industry, Construction and Shipyard standards §1910.1024, §1926.1124, and §1915.1024 in a May 2018 memorandum. In August 2018, OSHA delayed additional requirements of the beryllium standards for General Industry until December 31, 2018.

OSHA has filed a notice of proposed rulemaking for the Construction and Shipyard industries to study the removal of ancillary provisions. This is essentially everything from medical surveillance to PPE and addressing beryllium exposures through the existing regulations listed below.

- Ventilation standard in Construction (1926.57).
- Criteria for personal protective equipment standard in Construction (1926.95).
- Mechanical paint removers standard in Shipyards (1915.34).
- Ventilation and protection in welding, cutting and heating in Shipyards (1915.51).
- Hand and body protection standard in Shipyards (1915.157).
- Confined and enclosed spaces standards in Shipyards (Part 1915 Subpart B).
- Ventilation standard in General Industry for exhaust ventilation and housekeeping (1910.94(a)(4), (a)(7).
- Respiratory Protection standard in General Industry (1910.134).
- Hazard communication standard in General Industry (1910.1200).

OSHA has noted, however, that abrasive blasting in construction, abrasive blasting in shipyards and welding in shipyards are known to have high exposures and may be regulated differently.

WHAT'S BEING ENFORCED TODAY

The three standards established a permissible exposure limit (PEL) and a short-term exposure limit (STEL) as follows.

- The PEL is 0.2 µg/m^3 as an eight-hour time-weighted average (TWA).
- The action level (AL) is 0.1 µg/m^3 as an eight-hour TWA.
- The STEL is 2.0 µg/m^3 as a 15-minute sample (during the highest expected exposure period).

OSHA states that all of the standards do not apply to materials containing less than 0.1 percent beryllium by weight *where employers have objective data* demonstrating that employee exposures will remain below the AL as an eight-hour TWA under any foreseeable conditions.

They go on to note that the exception does not apply where exposures below the AL *are expected or achieved only because engineering or other controls are being used to limit exposures*. This would apply to nearly all abrasive blast-cleaning operations.

The OSHA Safety and Health Topics website states that, "Certain types of slags (e.g. coal, copper) used in abrasive blasting operations may contain trace amounts of beryllium (less than 0.1 percent by weight). Due to the high dust conditions inherent in abrasive-blasting operations, workers involved in these activities may be exposed to dangerous levels of beryllium." Similarly, OSHA has stated in the notice of proposed rulemaking, that "OSHA has evidence that beryllium exposure in these sectors has limited the following operations: abrasive blasting in construction, abrasive blasting in shipyards and welding in shipyards."

The aforementioned seems to suggest that if you use beryllium-containing abrasives in any of the three regulated industries you must at least evaluate worker exposures to see if they are above the PEL.

If you are in General Industry, in addition to the aforementioned, the exposure assessment must be in full compliance with §1910.1024(d) including the STELs.

If exposure monitoring is above the PEL or STEL, those in General Industry must comply with the requirements for respiratory protection

OFFICE TO FIELD: LOST IN TRANSLATION

§1910.1024(g), medical surveillance §1910.1024 (k) and medical removal at §1910.1024(l).

WHAT'S BEING ENFORCED JANUARY 2019

The following requirements are in effect for General Industry January 2019.

- Beryllium work areas and regulated areas.
- HEPA vacuuming or wet wiping of PPE, equipment and contaminated areas.
- Training in health effects, regulation and control plan similar to lead.
- Record keeping.
- PPE required if above PEL or STEL or there is reasonable expectation of dermal contact (i.e., all personnel).
- Hand wash facilities.
- Keep surfaces free as practicable of beryllium and clean up releases.
- Signs and labels.

WHAT'S REQUIRED IN MARCH 2019

In General Industry, if exposures are above the PEL or STEL or there is reasonable expectation of dermal contact, then change rooms and showers in paragraphs (i)(2 & 3) are required.

WHAT'S NEXT

In General Industry, requirements for engineering controls in paragraph (f) begin March 10, 2020. These must also meet 1910.94, ventilation requirements for abrasive blast cleaning.

SO WHAT SHOULD YOU DO?

If you are in general industry, make sure you are on track to implement the aforementioned items. Plan ahead to guarantee that you can achieve the requirements by the specified dates.

For all industries, in the absence of objective evidence, follow the recommendations provided by the manufacturer in the safety data sheet and begin evaluating potential airborne exposures of abrasive blasters and associated personnel (for example, vacuumers, equipment operators and laborers performing cleanup) to determine the likelihood of them exceeding the PEL or STEL. If exposures occur in General Industry, verify you meet the above. For Construction and Shipyard, verify that adequate respiratory protection is provided and consider other ways to reduce worker exposures.

SILICA STANDARD IN FULL EFFECT

If you use a crystalline-silica-containing abrasive or will perform surface preparation on silica-containing materials, you need to be certain you are in compliance. The standard establishes a PEL of 50 µg/m³ as an eight-hour time-weighted average or an AL of 25 µg/m³ as an eight-hour TWA. Regardless of which exposure-control method is used, all construction employers covered by the standard are required to accomplish the following.

- Establish and implement a written exposure-control plan that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur.
- Designate a competent person to implement the written exposure-control plan.
- Restrict housekeeping practices that expose workers to silica where feasible alternatives are available.
- Offer medical exams including chest X-rays and lung-function tests initially (within 30 days of assignment) and every three years for workers who are required by the standard to wear a respirator for 30 or more days per year.
- Train workers on work operations that result in silica exposure and ways to limit exposure.
- Keep records of exposure measurements, objective data and medical exams.

Initial enforcement of the silica standard violations indicate the following.

1. Failure to conduct exposure assessment.
2. Respiratory protection.
3. Lack of a written exposure control plan.

Eight percent of all violations are categorized as serious.

No matter how you feel about it, the beryllium standard is in effect for General Industry and at least being evaluated for Construction, and silica is in full effect. From a health-and-safety standpoint, make sure you have evaluated potential exposures for abrasive-blasting-related tasks so you can prove non-exposure or be ready to implement any required controls.

SNOOZING NOT LOSING:

NOVEL IMM COATINGS WITH INCREASED PRODUCTIVITY FOR CUI SERVICE

BY MIKE O'DONOGHUE, PH.D.; VIJAY DATTA, MS; GEORGE SYKES; GRAEME ROSS AND ANA SANSÉAU-BLANCHARD M.CHEM; AKZONOBEL

To develop an innovative and game-changing coating is an exciting and highly challenging enterprise where successful chemists are in their element as they positively impact productivity in the world of applicators, fabricators and asset owners. They are also mindful that if they "snooze, they might lose" in a highly competitive coatings industry.

This article focuses on a novel multi-polymeric matrix coating for corrosion under insulation service (CUI) that will, as-it-were, snooze but win in a dormant mode as it protects process pipes, valves and vessels that might lay around for months at ambient conditions. On the other hand, the novel inert-multi-polymeric matrix (IMM) coating will also win as it goes into a full weaponized mode when it protects the same steel items exposed to cryogenic conditions or hot CUI service.

Due to increasing demand for energy around the world, the prevalence of global megaprojects within the oil and gas industry is increasing. Process pipes, valves and vessels may be manufactured and coated in China or Korea, where labor costs are comparatively low, before being transported to their final project location, such as North America. During the transport and fabrication phase, coated steelwork may spend months or even years exposed to harsh offshore and coastal environments prior to going into service. This means coatings must be able to provide protection throughout an extensive construction phase, in addition to the in-service lifetime of the steel.

While standard atmospheric anticorrosive coatings such as inorganic zinc silicates and epoxies are designed for long periods of exposure in corrosive offshore environments, it is well-known that temperature-resistant coatings often rely on some degree of post-cure at elevated temperatures to attain full anticorrosive properties and damage resistance. This is especially the case for inorganic silicone coatings (often collectively termed IMM coatings), which have widespread use within the oil and gas industry due to their excellent flexibility and resistance to temperatures up to 1,202 F (650 C).

Unfortunately, the deficiency in their ambient cure has led to examples of substrates protected with IMM coatings corroding prior to entering service for their intended end use. And while inorganic zinc-silicate primers can be used to protect IMM coatings against ambient-cure breakdown, the former are difficult to apply and cure correctly, and the requirement for an extra coat in the system reduces productivity.

Most importantly, the inorganic zinc coatings are not recommended for use under insulation due to the specter of possible rapid consumption of zinc in the harsh environment on the steel surface[1]. A coating is required that combines excellent ambient cure and high-heat performance, without the use of an inorganic zinc-silicate primer. But the question then becomes how to adequately demonstrate the effectiveness of such a coating to withstand corrosive ambient temperature environments. One answer is to test the coating according to appropriate ISO standards. As we shall see, ISO 12944:2018, "Paints and varnishes — Corrosion protection of steel structures by protective paint systems" will figure prominently in answering this question.

Fig. 1: Natural exposure site in the northeast of England (CX environment). Figures courtesy of the authors.

IMM COATINGS TESTED FOR AMBIENT TEMPERATURE CORROSION

An accelerated laboratory testing program was carried out to investigate the performance of seven IMM coatings, all proven performers in the oil and gas industry. As shown in Table 1, four of the IMM coatings were single-component (1K) and three were 2K coatings. Each was rated for service temperatures from -321 F (-196 C) to 1,202 F on insulated and uninsulated carbon and stainless steel.

The novel IMM coating was a next-generation version of current IMM technology and consists of a two-pack, aluminum-pigmented silicone coating that provides both corrosion and heat resistance.

EXPERIMENTAL

All carbon steel test plates and carbon steel pipes were abrasive blast-cleaned to an SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning" standard using steel grit. A 3-mil jagged profile was obtained. For high-heat

testing up to 1,202 F, ASTM A387 (Standard Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum) Grade 11 steel was used.

The liquid IMM coatings were applied at approximately 5 mils (127 µm) DFT per coat by airless spray and cured at 68 F (20 C) for seven days prior to conducting various tests.

Non-Insulated Performance

Three sets of tests were carried out on the IMM coatings applied to carbon steel plates.

1. Anticorrosive performance at ambient temperature.
   a. Cyclic aging test (ISO 12944-6:2018)[2].
   b. ASTM D5894 accelerated laboratory test[3].
   c. Natural exposure in a CX (extreme) environment.
2. Anticorrosive performance after exposure to 401 F (205 C).
3. Dry heat resistance.
   a. At 392 to 572 F (200 to 300 C).
   b. At 752 (400 C) to 1,202 F.

Fig. 2: Houston pipe test experimental setup for IMM-coated carbon steel pipes.

1. ANTICORROSIVE PERFORMANCE AT AMBIENT TEMPERATURE

A. CYCLIC AGING TESTING (ISO 12944-6:2018)

Traditionally, a number of internationally recognized standards have been developed to provide an indication of how a coating system will perform in-service in an accelerated time frame and to assess the suitability of a coating for a particular environment. These include ASTM B117 and ISO 9227, which involve continuous exposure to salt fog at 95 F (35 C), and ASTM G85, a modified salt fog test with wet/dry cycling and low pH.

One of the concerns with ASTM B117 and ISO 9227 is that continuous exposure to salt solution is unrepresentative of conditions experienced by coatings in the real world[4,5]. Although modified salt spray standards have been developed, this overall problem remains. The cyclic aging test introduced in the ISO 12944-6:2018 standard provides an accelerated test that subjects the coating to conditions more closely related to those seen in the field. This includes UV and condensation exposure at high temperatures to mimic the strong sunlight that the coating experiences in an external environment, exposure to hot salt fog to simulate corrosive conditions experienced in an aggressive corrosive environment and a freeze cycle to introduce the stresses associated with diurnal and seasonal temperature variations.

The cyclic aging test for C5 environments (high durability, as stated in ISO 12944-6:2018) consists of 10 cycles of the following, each cycle being one week in length.

- 72 hours QUVA (ISO 16474-3:2013 Method A) – Cycling between 4 hours UVA exposure at 140 F (60 C) and four hours condensation exposure at 122 F (50 C).
- 72 hours continuous exposure to 5wt-percent salt solution at 95 F (35 C) (neutral pH) (ISO 9227).
- 24 hours freeze cycle at -4 F ±3.6 F (-20 C ±2 C).

A 2-mm-thick artificial defect or scribe is introduced to coated 6-inch-by-3-inch steel panels prior to testing. Post-test panels were assessed for defects on the face of each panel. The coating around the scribe was then removed to determine the corrosion creep.

The pass criteria for the cyclic aging test include the following.

- Average corrosion creep from the scribe is 3 mm or less.
- No defects on the face of the panel such as blistering, rusting, cracking or flaking.

B. ASTM 5894 TESTING

This cyclic test was carried out for 12 cycles of the following, each cycle being two weeks in length.

- 168 hours QUVA (ISO 16474-3:2013 Method A) – Cycling between four hours UVA exposure at 140 F and four hours condensation exposure at 122 F.

Table 1: Coatings Tested (SP0198-2017 CS-6).

Coating	Packs	Coating Type	Max Steel Service Temperature	System Tested 7-day cure (68 F)
1	2K	Novel IMM	1,202 F	2 x 5 mils DFT
2	2K	IMM	1,202 F	2 x 5 mils DFT
3	2K	IMM	1,202 F	2 x 5 mils DFT
4	1K	IMM	1,202 F	2 x 5 mils DFT
5	1K	IMM	1,202 F	2 x 5 mils DFT
6	1K	IMM	1,202 F	2 x 5 mils DFT
7	1K	IMM	1,202 F	2 x 5 mils DFT

Table 2: Dry Heat Cyclic Tests.

Step	Test 3A: 401 – 572 F	Test 3B: 752 – 1,202 F
1 – 24 hours exposure to	401 F (205 C)	752 F (400 C)
2 – 24 hours exposure to	572 F (300 C)	1,202 F (650 C)
3 – 96 hours exposure to	401 F (205 C)	752 F (400 C)
4 – 24 hours exposure to	Ambient (77 F / 25 C)	Ambient (77 F / 25 C)

Table 3: Degree of Rusting and Rusted Area (ISO 4628-3).

Degree of Rusting	Rusted Area
Ri 0	0%
Ri 1	0.05%
Ri 2	0.50%
Ri 3	1%
Ri 4	8%
Ri 5	40 to 50%

System	Novel IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
Photo							
Corrosion Creep (mm)	2.8	4.2	2.6	Could not be measured as too much underfilm corrosion	2.1	5.8	Could not be measured as too much underfilm corrosion
Defects	None	None	None	Ri4	Ri2	Ri1	Ri5

Fig, 3: Cyclic aging test results (ISO 12944-6:2018).

- 168 hours prohesion (ASTM G85) – Cycling between one hour acidic fog exposure (0.05-percent sodium chloride and 0.35-percent ammonium sulfate aqueous solution) and one hour dry off at 95 F.

A 2-mm-thick artificial defect or scribe was introduced to two of the coated 6-inch-by-3-inch steel panels prior to testing. The remaining panel was left undamaged to get a better understanding of the barrier properties of each coating.

Post-test panels were assessed for defects on the face of each panel. The coating around the scribe was then removed to determine the corrosion creep.

The pass criteria for this test was no defects on the face of the panel such as blistering, rusting, cracking or flaking. There were no pass/fail criteria for corrosion creep from the scribe; this was only used as a comparison tool between the different coatings.

C. NATURAL EXPOSURE IN A CX ENVIRONMENT

While accelerated test methods are useful to evaluate coatings and get quick results, the real proof of performance lies in the actual environment to which coatings will eventually be exposed.

Coatings were applied to 12-inches-by-4-inches-by-.15-inch carbon steel panels and left to cure for two months at ambient temperature (68 F) before being exposed at a coastal site in the northeast of England (a CX corrosivity category environment).

The atmospheric corrosivity of the site was determined by measuring the corrosion rate of a standard specimen according to ISO 9223:2012 and ISO 9226:2012. Coatings were assessed at regular intervals, however results presented will concentrate on short-term exposure (four weeks) and slightly longer-term exposure (24 weeks) (Fig. 1, p. 24).

2. ANTICORROSIVE PERFORMANCE AFTER EXPOSURE TO 401 F

This cyclic test consists of six cycles of the following, each cycle at four weeks in length.

- 336 hours exposure to high heat in an oven set at 401 F.
- 336 hours cyclic corrosive testing (equal to one full cycle of testing according to ASTM D5894, as explained in section B.

System	Novel IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
Photo							
Corrosion Creep (mm)	1.9	0.2	2.1	2.5	1.3	3.7	4.4
Defects	None	None	None	Ri1	Ri1	Ri2	Ri2

Fig. 4: Results after 12 cycles of ASTM D5894 cyclic testing.

System	Novel IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
Photo							
Defects	None	None	None	Ri3	Ri1	Ri1	Ri3

Fig. 5: Results after four weeks of exposure in a CX environment (northeast England).

At the end of each cycle, panels were photographed and assessed for any defects on the face of each, such as blistering, rusting, cracking or flaking.

3. DRY HEAT RESISTANCE

Both tests were carried out using the same heat cycling steps, the only difference being the temperatures and test duration. Table 2 (p. 25) illustrates the steps that make up one cycle.

The lower temperature test (3A) was carried out for 18 cycles. The higher temperature test (3B) was carried out for two cycles.

At the end of each cycle, panels were photographed and assessed for any defects on the face of each panel.

Performance Under Insulation

Performance under insulation was assessed up to 932 F (500 C) using the Houston pipe test.

1. HOUSTON PIPE TEST

Previous CUI studies by the authors have used the accelerated laboratory Houston pipe test

to benchmark, compare, contrast and prequalify candidate immersion-grade IMM coatings applied to small-diameter carbon or stainless steel pipes[6].

In the present work, carbon steel pipes were 60 cm long and 6 cm in outside diameter, with a 5-mm-thick wall. To measure the surface temperature of the pipe under the insulation, thermocouples were positioned at intervals from the bottom (hot end) to the top (cold end) of the pipe. Each pipe was encased in 5-cm-thick calcium silicate insulation sleeves and then wrapped with aluminum cladding.

To evaluate IMM performance on insulated steel pipes, the CUI cyclic test procedure was conducted as follows.

- At the beginning of the day, one liter of 1-percent NaCl solution was poured slowly into the insulation surrounding the pipe at the top of the pipe.
- The pipe was then placed on a hot plate, which was immediately turned on and set to 932 F. The hot end of the pipe reached approximately 752 F (400 C) within two-to-three hours.
- After eight hours on the hot plate, the insulated pipe was removed from the heat and placed in a shallow pan.
- One more liter of 1-percent NaCl solution was poured into the insulation whereupon the insulated pipe was allowed to cool overnight.

Both ends of the insulation were left open to facilitate entry and drainage of the NaCl wetting solution (Fig. 2, p. 25).

The liquid was mostly absorbed by the insulation with only a small amount of drainage from the bottom. The temperature profiles for the carbon pipes were slightly different. The procedure was repeated five days a week for six weeks, for a total of 30 cycles, whereupon the insulation was removed from the pipes and the coating performance was evaluated based on visual examination including color change, degree of rusting, blistering, flaking and cracking (ISO 4628, Sections 2 through 5).

There were two ways to express the actual temperature sustained by the coatings: dry and wet.

Dry temperature

- Measured at the beginning and end of the test with dry insulation.
- Running from 752 F (bottom of pipe) down to 248 F (120 C) (top of pipe).
- Exposure of the coatings to high temperature at the beginning of the test (cracking potential).

Wet temperature

- Measured at three points (bottom, middle, top) throughout the test with wet insulation.
- Running from 392 F (200 C) down to 122 F.
- The sweet point for formation of corrosion under insulation.

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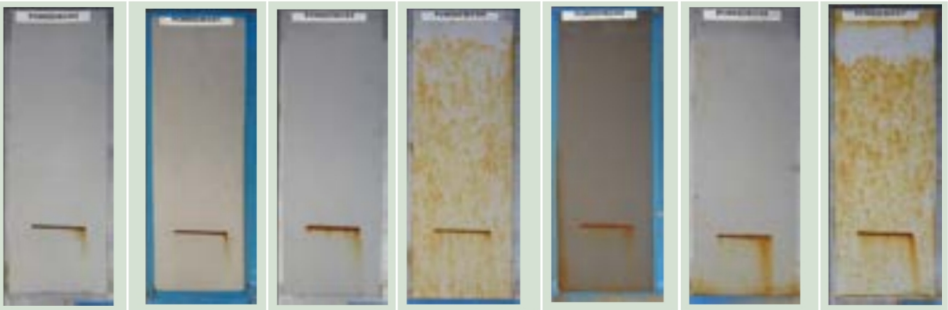
System	Novel IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
Photo							
Defects	None	None	None	Ri3	Ri2	Ri2	Ri3

Fig. 6: Results after 24 weeks of exposure in a CX environment (northeast England).

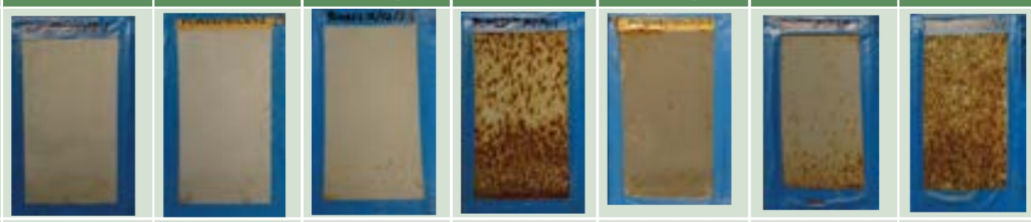
System	Novel IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
Photo							
Defects	No defects	No defects	Ri1	Ri4	Ri3	Ri3	Ri5

Fig. 7: Results after six cycles of exposure to 401 F (205 C) and ASTM D5894.

RESULTS AND DISCUSSION

Non-Insulated Performance

1. ANTICORROSIVE PERFORMANCE AT AMBIENT TEMPERATURE

Unlike traditional IMM coatings, ambient cure anticorrosive properties are attained prior to post-cure during high-heat service. In order to demonstrate this, the novel IMM coating was tested in accordance with ISO 12944-6:2018 (C5) against other commercially available IMM coatings. The key requirements needed to pass the test are: 1) that corrosion creep from the scribe should be less than 3 mm after 1,680 hours of testing, and 2) there should be no other film defects (Table 3, p. 25).

Figure 3 (p. 26) shows the accelerated performance testing for the seven IMM coatings in a C5 environment according to ISO 12944-6:2018.

Coatings 1 (the novel IMM) and 3 performed very well with rust creep less than 3 mm and no defects observed. All other coatings either showed excessive rust creep or film defects. Coatings 4 (Ri4) and 7 (Ri5) performed the worst of all the coatings in this test.

Figure 4 (p. 28) shows the results of testing according to ASTM D5894 after 12 cycles. This is typical performance testing for industrial environments.

System	Novel IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
Photo (Microscope: x 150)							
Defects	No defects	No defects	No defects	Cracking: 4(S2)	Cracking: 3(S2)	No defects	Cracking: 4(S2)

Fig. 8: Results after 18 cycles of exposure up to 401 to 572 F (205 to 300 C) dry heat test.

System	Novel IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
Photo (Magnifying Lens: x 10)							
Defects	No defects	No defects	Cracking (2[S5]) and delamination	Cracking: 3(S2)	Cracking: 3(S2)	No defects	Cracking: 4(S2)

Fig. 9: Results after two cycles of exposure up to 752 to 1,202 F (400 to 650 C) dry heat test.

Again, Coatings 1, 2 and 3 were defect-free. Coatings 6 and 7 performed worst in this test. All other coatings showed varying degrees of rusting but not to the extent seen in the ISO 12944-6 cyclic aging test.

Figure 5 (p. 28) shows the results after four weeks of exposure in a natural CX coastal environment in the northeast of England. Figure 6 shows the results after 24 weeks of exposure in the same environment.

After four weeks of exposure, no defects were seen in Coating 1, nor Coatings 2 and 3. Coatings 4 through 7, however, all showed some measure of degradation, with Coatings 4 and 7 being the worst performers. A similar conclusion was drawn after 24 weeks, although the conditions of Coatings 5 and 6 worsened slightly with further rust spots appearing.

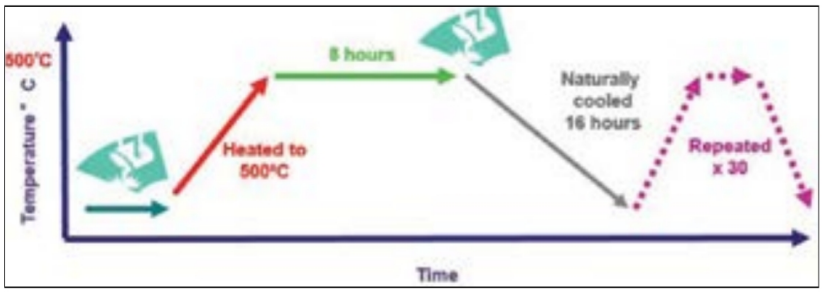


Fig. 10: Houston pipe test protocol.

2. ANTICORROSIVE PERFORMANCE AFTER EXPOSURE TO 401 F

The purpose of this test was to look at the cycling between a high temperature (401 F) and an ambient temperature where there is a potential for the following conditions.

- Cracking of the coating at a high temperature.
- Corrosion of the substrate when the asset cools down to an ambient temperature particularly if the coating cracked in the previous step or if it offers poor barrier properties against corrosion.

This kind of cycling can be seen during shutdown of plants or with non-continuous processes.

One cycle consisted of two weeks of exposure to 401 F followed by two weeks of cyclic corrosive testing (ASTM D5894 – UV exposure/condensation/salt fog/dry). Figure 7 (p. 30) shows results after six cycles of this test.

The Novel IMM, Coating 1 and Coating 2 showed no defects at the end of the test. Coatings 4 and 7 again showed the worst performance with Coatings 3, 5 and 6 also showing corrosion, although to a lesser extent.

3. DRY HEAT RESISTANCE

Figure 8 (p. 31) shows results after 18 cycles of temperature cycling between 401 F and 572 F and microscopic photos of each coating taken at the end of the test.

After 18 cycles, the longer-term temperature resistance of these types of coatings varied considerably. Coatings 1, 2, 3 and 6 did not have any visible defects. However, Coatings 4, 5 and 7 had developed significant hairline cracks visible to the naked eye.

Figure 9 (p. 31) shows results after two cycles of temperature cycling between 752 and 1,202 F.

Close inspection under 10-times magnification showed that Coatings 1 and 2 performed very well. Coating 3, which did very well in previous corrosion test, showed severe cracking. Coatings 4 and 7 exhibited some hairline cracks. All other coatings performed well

except for some minor pinholes. The key findings were as follows.

Ambient-Cured IMM Coatings

Anticorrosive performance at ambient conditions (without heat cure) is widely variable across the coatings tested. Similar conclusions could be drawn with accelerated testing and external exposure.

- Coatings 1 and 3 showed both excellent barrier protection and rust creep resistance.
- Coatings 2, 5 and 6 had acceptable anticorrosive performance, although showed some weakness either in terms of creep resistance or barrier protection.
- Coatings 4 and 7 demonstrated very poor anticorrosive performance.

Given how fast corrosion began to develop (in less than four weeks), external exposure highlighted issues that some of the coatings could face if left unprotected even for a short period of time (all 1K tested, but more particularly Coatings 4 and 7)

IMM Coatings Exposed to High Temperatures

There is also clearly a discrepancy in the level of heat resistance offered by the various coatings.

- Coating 3 showed signs of internal stress that were exacerbated when placed at high temperatures (752 F with intermittent 1,202 F) by cracking and delaminating from the substrate.
- Coatings 4 and 7, although better than Coating 3, started to develop hairline cracks after only two weeks of a heat cycle between 752 F and 1,202 F, as well as longer term in heat cycling between 401 F and 572 F.
- Coating 5 developed hairline cracks at a lower temperature (401 F to 572 over a long test period.
- All other coatings had no defect after the same time period.

Performance Under Insulation

Figure 10 represents the Houston pipe test protocol used in the present work. Figure 11 (p. 34) shows the condition of the pipes after testing at 122 to 752 F in the Houston pipe test.

The key findings can be summarized as follows.

IMM Coatings Tested at Elevated Temperatures Under Insulation

- Not all coatings are equal when it comes to protection against corrosion under insulation, notwithstanding claims to the contrary as evidenced by technical data sheets.
- Most of the 1K coatings tested suffered under insulation when temperatures stayed at less than 392 F, indicating that heat cure at 392 to 482 F might be necessary in order to offer adequate anticorrosive protection.
- The Novel IMM coating offered excellent protection against CUI across the whole temperature range tested compared to some of the other IMM coatings, without the need for post-curing.

Overall, the following conclusions can be drawn from this test program.

NOVEL IMM COATINGS FOR CUI SERVICE

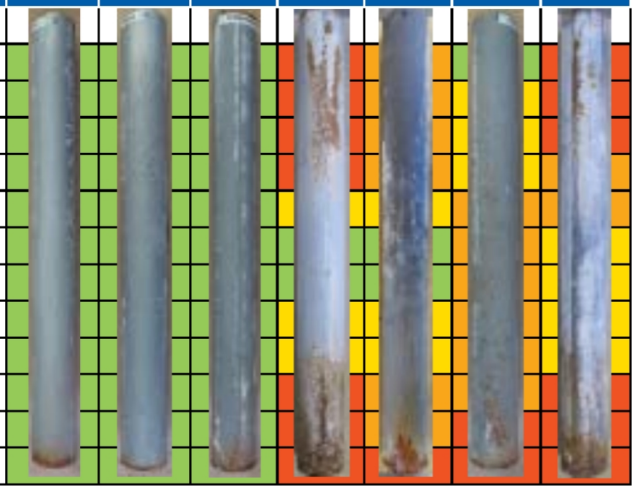
Pipe Temperature (F)		System						
Dry	Wet	IMM 1	IMM 2	IMM 3	IMM 4	IMM 5	IMM 6	IMM 7
								
248	122-176							
284								
347								
374								
392								
437	167-266							
482								
527								
572								
626								
707								
752	230-392							

Fig. 11: Results after 30 cycles in Houston pipe test.

- Previous IMM technologies usually perform well at high temperatures greater than 392 F, although this test program has shown that it is not always the case.
- Previous IMM technologies (particularly 1K coatings) require a post-curing step in order to reach their maximum protective potential.
- This can involve trading off anticorrosive performance at ambient temperatures up to 212 to 302 F or having to use a zinc primer meaning an extra coat, extra cost and not even suitable at greater than 752 F.
- The novel IMM affords broad anticorrosion performance from cryogenic up to 1,202 F including ambient conditions, without the need for post-cure or a zinc primer.

CASE HISTORY NO. 1: NOVEL IMM 1 COATING SYSTEM

To aid new development and growth, a major onshore oil-and-gas project was commissioned at a coastal location in Central Asia.

To reduce fabrication costs, the project modules were fabricated in the Far East, then shipped to site for commissioning over an extended, four-year construction period. Due to the enormous scale of the project, coated pipes, valves and vessels were required to spend long periods of time on the quayside or at the project site, where they

were exposed to highly corrosive conditions prior to commissioning. This was highlighted as a key issue as it had the potential to cause major challenges for a traditional IMM coating technology prior to commissioning.

The novel IMM 1 coating was chosen as an effective solution to this challenge for the many pipes and other equipment used on this project (Fig. 12, p. 36). Backed up by a solid track record and test data, the coating demonstrated excellent resistance to the corrosive, ambient-temperature conditions that were the norm prior to the equipment becoming operational. The fact that the coating did not require a heat cure prior to use greatly reduced overall rework costs and the risk of early failure prior to project start-up.

CASE HISTORY NO. 2: NOVEL IMM 1 COATING SYSTEM

Due to increases in demand for refined chemicals, additional capacity was required at a large chemical plant in Europe.

As part of the expansion, new processing equipment designed to run at high temperatures was required and a robust coating system needed to be selected. On-site processes could regularly run as high as 608 F (320 C) and so traditionally, equipment had been coated using a two-coat high-temperature system of inorganic zinc silicate, followed by a topcoat of silicone aluminum. Although suitable for high temperatures, this system was far from ideal as the soft silicone aluminum topcoat was easily damaged, causing early failure in service. Due to the handling and transport process between the application shop and site, a particular cause for concern were the large ethylene processing vessels where damages were regularly observed.

The novel IMM 1 coating system was chosen as a replacement for the traditional two-coat solution (Fig 13, p. 36). The enhanced hardness of the coating greatly reduced the amount of damage on the vessels after transport, reducing touch-up and on-site repair costs. Additionally, the applicator reduced the different types of coatings needed to complete the job, improving quality and reducing wasted paint costs.

WHEN ALL IS SAID AND DONE

From the suite of accelerated laboratory tests, the novel IMM coating for corrosion under insulation service should perform exceptionally well in that "snooze" and apparently dormant mode as it protects process pipes, valves and vessels at ambient temperature. Furthermore, its ambient-cure performance is a distinct improvement over other IMM coatings in the expectation that it can withstand the often significant period of time between coating application and the commencement of high-heat service.

When specifying coatings for service at elevated temperatures, the ambient temperature conditions and duration of time that the steelwork may be exposed prior to going into service must be considered. The novel

Fig. 12: Pipes and flanges coated with the novel IMM 1 coating system.

Fig. 13: Stripe-coat application of novel IMM 1 on process vessel wall (left) and finished vessel wall (right).

IMM coating complies with the anticorrosive performance requirements of the ISO 12944-9:2018 standard and is well-equipped to withstand severe conditions between coating application and entering high-heat service.

CONCLUSIONS

In the accelerated laboratory tests, most but not all of the IMM coatings performed well at temperatures greater than 392 F. The novel IMM coating affords broad anticorrosion performance from cryogenic to 1,202 F including ambient conditions and without the need for post-cure or a zinc primer.

The majority of the IMM coatings — particularly the 1K coatings — require post-curing to provide adequate anticorrosion protection. Most IMM coatings may require a zinc primer for adequate anticorrosion protection if used between ambient temperature and 302 F.

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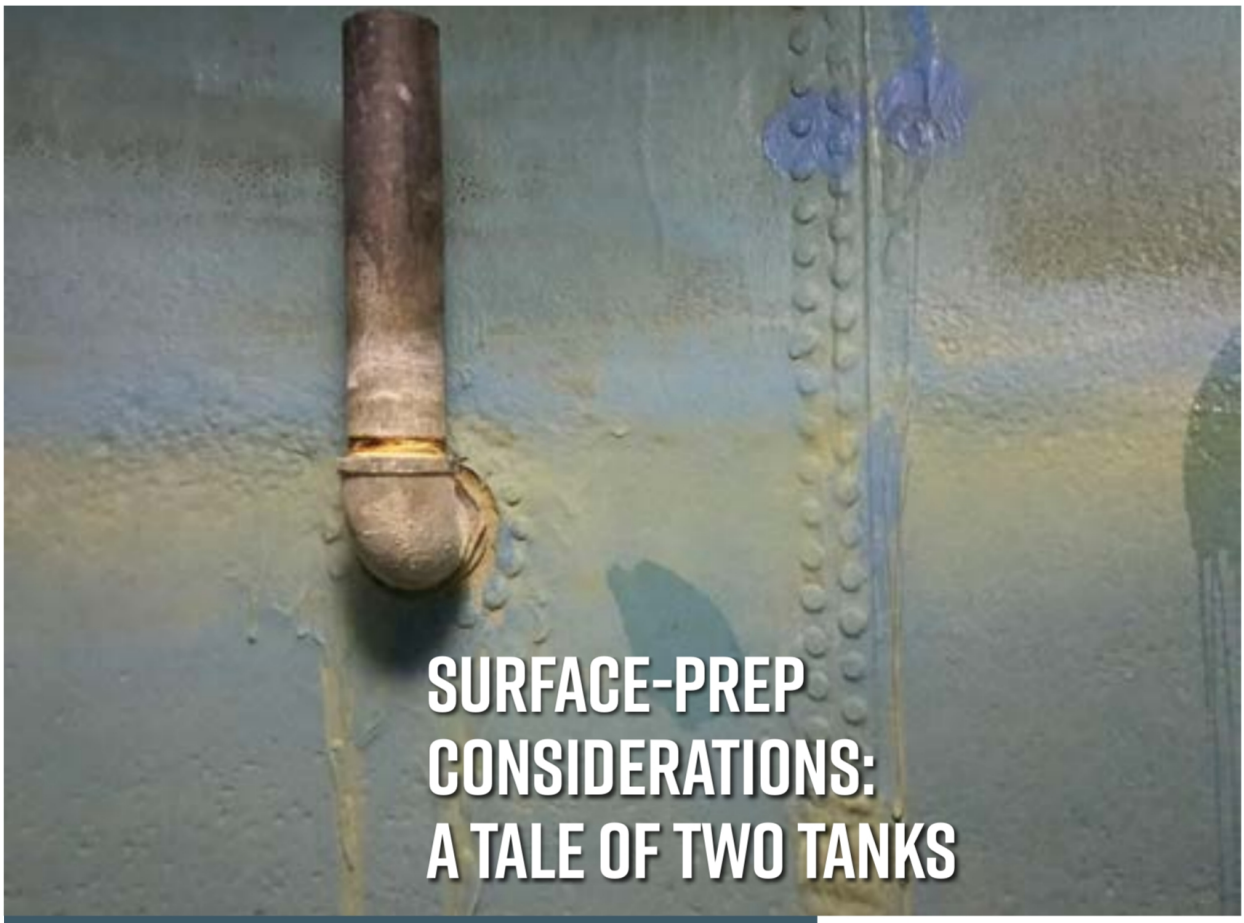

SURFACE-PREP CONSIDERATIONS: A TALE OF TWO TANKS

BY WARREN BRAND, CHICAGO CORROSION GROUP, LLC.

Fig. 1: The interior of one of the twin tanks. Runs and drips covering rivets and the lap-joint are clearly visible from the original spray application over 25 years earlier. However, no rust, corrosion, degradation or coating distress is exhibited. Photos courtesy of the author.

Nobody in this industry will argue against the fact that surface preparation is indeed the most impactful part of a coating project. Methods and implementation can determine the service life and success or failure of a coating. The fundamentals of surface preparation remain basic, but site logistics can spin two seemingly similar projects down very different paths.

Imagine, if you will, two water-storage tank-coating projects. The structures are inherently alike, but the circumstances surrounding them are very different and logistics dictated considerably different approaches to each.

PROJECT NO. 1: THE TWINS

Not too long ago, the author received a call from a Chicago landmark where he'd worked 25 years earlier. The site was an iconic building built in the late 1800s. All brick and mortar, it was sequestered adjacent to the Chicago Financial District like an old-time speakeasy, yet at 19 stories, it would've been considered a skyscraper back in its day. The building is so old, in fact, that its two drinking-water tanks situated on the 19th floor were riveted rather than welded, as welding wasn't widely used until the early 1900s. It was rumored that these two tanks had once been boilers used on paddle wheelers on the Mississippi River.

Rivets, like nuts and bolts, are a challenge to abrasive blast and coat because they're three-dimensional (Fig. 1). Further, riveted tanks are typically much thicker than welded tanks and the seams are lapped as opposed to butted. Therefore, between the rivets and seams, the blast operator would have to circle each rivet to ensure effective blasting all around it and also change the angle of the blast nozzle to get to the inner faces of the lap welds.

The Twins were located up a rickety staircase in a small room. To make matters more complex, the tanks themselves were small, measuring slightly larger than a coffin at 3 feet in diameter by almost 9 feet tall with a 24-inch manhole near the base. Picture three people in a phone booth (if you remember what those are) trying to carve a pumpkin.

On any given project, effort must be put

forth to address the practicalities of the work product, the working conditions and the morale of the people doing the work. With the Twins, great care was taken to ensure that the technician blasting the tank was smaller in stature and took frequent breaks (Fig. 2). Getting a cramp, twisting an ankle or straining one's back in such a confined space could quickly become an urgent and difficult rescue.

Because these tanks were located in a commercial setting, sensitivity mandated that a compressor be parked at street level and roughly 250 feet of air hose run through the internal stairway to the blast pot and spray rig on the 19th floor

Fig. 2: The author compressing considerable girth to egress interior inspection of one of the twin tanks.

PROJECT NO. 2: THE BEHEMOTH

Unlike the Twins, this tank, which we'll call the Behemoth, was being repurposed from storing chemicals to storing drinking water. The Behemoth was outside, exposed to the elements, uninsulated, and therefore exposed to the vagaries of a fast-approaching Chicago winter (Fig. 3). The work had to be done in late November and carry through into late December — not the ideal time to be doing highly technically challenging internal tank lining in the Chicago area.

In contrast to the Twins, the work on the Behemoth required similar considerations based on different logistical constraints. The Twins allowed for only one man moving very carefully inside a tiny space, but the Behemoth accommodated three men blasting simultaneously. Where the Twins was a ballet, the Behemoth was a rugby match.

The walls of the Behemoth were nearly an inch thick because it was initially built for chemical service. For access, the client cut a garage-sized entryway right into its side that was later welded back into place and then recoated (Fig. 4, p. 42). The Behemoth was the epitome of an industrial project where workers literally drove huge manlifts right in through the side.

While the Twins were tucked into a warm nook close to the laundry (with the tank's surface temperature around 80 F), the

Fig. 3: A side view of the Behemoth. The tank was constructed of steel nearly an inch thick.

Behemoth was completely exposed and required the use of supplemental heating. The tank needed to remain warm for two reasons: first, to ensure that no ice built up on its walls, and second, to ensure that the surface temperature of the steel was warm enough to accommodate the coating system, which called for a minimum application temperature of 60 F.

One of the client's engineers inquired about heating the tank during blasting operations as well. The contractors, coating supplier and everyone else said no, it wasn't necessary, however, the author spoke up.

Having been a contractor himself, he knew that working in temperatures between 20 and 40 degrees was fatiguing, particularly while abrasive blasting. The temperature required layers of winter clothing, a blast hood, thick gloves and a Tyvek suit, all while moving a blast whip back and forth for hours on end. Removal of the blast grit would take longer, and the job would likely take longer as well, simply because the workers would be cold.

Further, in cold temperatures there is the possibility that ice crystals could form invisibly on the steel during blasting, which could potentially cause rusting and other issues when the tank was then warmed.

Therefore, it was recommended that the tank be heated throughout the entire process, blasting included. The additional cost would be insignificant compared to the cost of the entire project and the job would be smoother. The workers would be more comfortable and morale would be higher.

Also of critical importance in a tank measuring 32 feet tall by 35 feet wide, is ensuring that the heat inside the tank is evenly distributed. It is an all-too-common mistake to heat a tank with insufficient airflow to establish uniform distribution of heat.

COMMONALITIES

When dealing with any internal tank lining there are a myriad of things that can go wrong. And when experts are called upon to conduct condition surveys or failure analyses, the culprit is usually one of three things:

Fig. 4: A garage-door-sized opening was cut into side of the Behemoth to provide interior access for vehicles, including scissor lifts, for the interior tank lining, inspection and associated work.

surface preparation, surface preparation or surface preparation.

Of course, there are other reasons for failure, but suffice it to say, suboptimal surface preparation is the predominant cause.

Why? Because surface preparation is difficult and requires precision, which is often overlooked and underestimated. First, it requires a well-written, asset-specific, site-specific specification. The importance of a specification customized to the particular needs of the client and the requirements of the specific asset cannot be stressed enough.

The fundamentals are simple; the details not so much. It's like talking about walking on the moon and telling Neil Armstrong to, "Just open the hatch and step down."

The simple part is that most potable water specs (depending, of course, on the coating system to be installed) are going to require an angular blast profile of between 2.5 and 4.5 mils. In both cases here, 12/40 grit coal slag was used. However, the surface must also be clean, dry and contaminant-free — and remain that way until coating is applied.

It is recommended to always shoot for a white metal blast, SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," even when, in many cases, "off-the-shelf" specs allow a near-white blast, SSPC SP 10/NACE No. 2, "Near-White Blast Cleaning." While a white-metal blast costs more than a near-white blast, data supports that it will lead to better long-term performance. And when working on water tanks, it is recommended to shoot for a no-maintenance design-life in excess of 10 years.

CONCLUSION

On the most fundamental level, a square inch of blasted steel is a square inch of blasted steel. What separates the two is the logistical challenges. When inspection work began on the steel substrates, the same equipment would be used — visual comparators for determining a white-metal blast, replica tape and gauges for determining blast profile — and, of course, monitoring environmentals to ensure there was no possibility of condensation on the surface or that the relative humidity wasn't too high. Lastly, testing for soluble chloride and other contaminants was conducted.

In both cases, a 100-percent-solids epoxy at 40-to-60 mils was applied, along with stripe coating. And, if during spraying, areas were found that needed additional material, it was added.

Both the Twins and the Behemoth projects went flawlessly. The coating system applied to the Twins will likely perform for another 25 years. The coating in the Behemoth was installed only six years ago and will most likely last for decades to come.

ABOUT THE AUTHOR

Warren Brand's coatings career has ranged from entry-level field painting to the presidency of two successful companies. Over nearly three decades, he has project-managed thousands of coating installations and developed specs for thousands of paint and coating applications. NACE Level-III and SSPC PCS 2 certified, Brand, an MBA and martial-arts instructor, now heads Chicago Corrosion Group, a coatings consultancy. He is a *JPCL* contributing editor and a regular blogger on paintsquare.com. ***JPCL***

ROPE ACCESS FOR INSPECTION, TESTING AND MAINTENANCE OF INDUSTRIAL STRUCTURES

BY KATHARINE STAY, IRATA INTERNATIONAL

Industrial rope access is a safe system for working at heights where ropes and associated equipment are used to gain access to and from the work position and to be supported there. When undertaken by a professionally trained and well-supervised workforce performing to set and establish operating procedures, industrial rope access delivers safe work practices for inspection, testing and maintenance of a wide range of industrial structures, often with significant advantages over alternative access methods. The primary objective when using rope access methods is to carry out the work safely and efficiently, while avoiding damage to property or harm to the environment. In order to ensure a safe system of work is maintained at all times, certified rope access companies conduct careful planning and management processes to ensure strict control prior to each operation. Nowadays, the application of industrial rope access is widespread throughout industry and is a globally accepted means of access.

A BRIEF HISTORY

The use of modern industrial skilled rope access teams began over three decades ago in response to demand by offshore platform operators for the inspection, maintenance and repair of their assets. In certain offshore environments, rig operators found alternative means of access challenging, with structures and machinery taking up much of the limited space available, and at times, potentially compromising other operations on the rig. In some cases, skilled rope access methods proved a more cost-effective and time-efficient solution to the work scope required; demand for industrial skilled rope access technicians therefore grew.

It was not long before some international oil and gas companies insisted on audited and certified rope access systems being employed, whenever rope access was used on their platforms. Today, such requirements are common in this industry.

Fig. 1: IRATA-certified rope access technicians, skilled in rigging, assisting an operator in the Dutch sector of the North Sea in the positioning of standing steel wire ropes. Photo courtesy of C2 Crane Inspection Services.

Discovering that workers on ropes were able to reach areas of the platform that were previously difficult, slow or costly to access by other means, owners of these installations turned to rope access companies for increasingly complex and specialized work. Some of these tasks have involved pioneering procedures that have either substantially reduced the time required for the work to be completed, extended the life of the rig, or its parts, or enabled rigs to be altered or repaired in situ — all resulting in improved efficiency.

The work solutions that rope access offered the oil and gas industry have proved so adaptable in this sector, that the tasks that technicians now complete offshore are

more varied and substantial than the basic maintenance work that was typical back in the 1990s. The wider acceptance and endorsement of rope access systems internationally, coupled with increasingly challenging and complex work scopes, means that many offshore technicians now hold specialist work-related qualifications relevant to inspection and maintenance, in addition to rope access qualifications. The solutions offered by rope access methods offshore, also proved to be valuable in a number of onshore industries. As such, technicians on ropes have been offering a vast portfolio of work for many years in a wide range of repair, maintenance, inspection and other work. Today, rope access teams are employed across the world and are as likely to be seen on the world's iconic sites as in your local town or industrial site.

Fig. 2: Suspended from a main and a backup line, a rope access technician inspects the surface of a substation, a structure built in the Netherlands and installed on an offshore wind farm in German waters. Photo courtesy of Height Specialists.

POWER AND PETROCHEMICAL

The core advantages of using rope access methods lie predominantly in the ease with which workers can safely gain access and egress from difficult-to-reach locations, often with minimal impact on other operations and surrounding areas. When compared with other means of access, a significant advantage is the reduction in man-hours and time-at-risk associated with setup operations required to gain access in the first instance. The absence of cumbersome access equipment facilitates work solutions at power stations, refineries and storage depots. The low spark/ignition risk with rope access methods also affirms it as a suitable solution. Where large access vehicles or structures might have insufficient room, or perhaps hinder other work, a rope access team can move around such locations without disruption to unrelated tasks. Work undertaken can range from basic inspection and minor repair, to substantial maintenance and even removal and replacement of a structure or equipment. There is also a role for industrial rope access when aging buildings need to be renovated, decommissioned or dismantled.

SHIPPING AND HARBORS

Large construction projects supporting the offshore sector are often undertaken with the aid of rope access systems. For example, industrial rope access is widely used for works on derricks and similar constructions, such as floating sheerlegs. Rope access work can often be observed in practice on large ships, both at sea and while in harbor.

Painting and inspection work can be carried out above the waterline while a vessel is in port or at sea, and even between tides if this is a factor. Additionally, the inspection and repair of deep locks can also be conducted in a short period, thus minimizing the time such a facility is out of commission.

Fig. 3: The wind industry is an ideal location for rope access, with remote locations and difficult access being common for such structures, particularly when located offshore. Photo courtesy of Skylotec GmbH.

Industrial rope access is at home on unusual structures and can achieve setup and dismantling times that no other means of access can rival. Due to this, work can often be undertaken by rope access means in a timescale that avoids any disruption to the normal work carried out at the jobsite. It is for these reasons that specialist certified rope access companies can often be found undertaking inspection and maintenance work in the great ports of the world where an access structure that prevents use of a crane or similar equipment can be obstructive and disruptive.

RENEWABLE ENERGY

The current global demand for clean energy has resulted in rapid growth in the renewable energy sector. In 2017, renewable energy, including wind, hydro and solar power supplied a record 12 percent of the world's energy needs, with over $200 billion of global investment[1]. In line with this drive is the increased development of wind turbines, often

Fig. 4: Inspection and maintenance of the pylons on the Yavuz Sultan Selim Bridge in Istanbul, Turkey by an IRATA-certified rope access technician. Photo courtesy of Yusek Isler.

Fig. 5: Non-destructive testing conducted by an IRATA-certified rope access technician in Izmir, Turkey. Photo courtesy of MIRA Rope Access.

situated in remote locations and predominately inaccessible to other access methods. Industrial rope access offers a safe, cost-effective and flexible method of access to enable regular maintenance and repair tasks for these structures.

Trained and certified rope access technicians now provide their skilled services worldwide in the renewable energy sector, conducting wind turbine blade inspection and repair, maintenance, painting and cleaning operations. Traditional rope access techniques combined with the use of advanced powered rope ascenders are now commonplace in this fast-expanding sector.

ROPE ACCESS SAFETY AND REGULATION

Like any other method of working at heights, the application of rope access should be regarded as a complete system in which planning, management, competence and suitable equipment are of equal importance, as each is dependent on the other to ensure a safe system of work.

Regulated, certified rope access companies are subjected to rigorous monitoring and controls over their training provisions and operation, together with strict adherence to an evolving regime of work and safety procedures. Not all rope access certification bodies audit their members; appropriate checks should be carried out before engaging a rope access contractor. It is essential that a rope access company is competent, i.e., has the skills, knowledge, experience and organizational capability to carry out their work in a way that mitigates risk to health and safety.

SELECTING A SUITABLE ROPE ACCESS COMPANY

It is imperative that all participants of a rope access project implement correct precautions

to minimize the risks of workplace dangers, safeguarding both employees and the public. It is ordinarily the client's duty to ensure that everyone understands the part they need to play in preparing and maintaining a safe working environment. The client therefore must be satisfied that the company chosen can do the job safely and without risks. This requires a process of due diligence, making inquiries about the competence of the rope access company such as, do they have the right combination of skills, experience and knowledge to fulfill the work scope? The degree of competence required will naturally vary according to the demands of the project. Similarly, the level of inquiries conducted by the client should be determined by the level of risks and the complexity of the job.

The customary questions that a client might ask during the bidding and selection process for work related to maintenance of industrial structures encompass the company's creditworthiness and solvency. Relevant points also include how the scope of work is defined, whether or not the quotation provided is detailed, clear and unambiguous, and whether or not the contract's terms and conditions are clear.

The client should pose a range of questions to potential rope access companies regarding specifics about project management, safety supervision, qualifications, training, execution of "toolbox talks," any subcontracting involved and any past enforcement issues.

The rope access company should also forward documentation on risk assessments undertaken for similar projects, provide information on their membership in any relevant trade associations and include information about any audits conducted by a certification body.

ROPE ACCESS: A STRATEGIC CHOICE

In summary, the utilization of industrial rope access methods should be construed as a complete system, comprising an essential mix of planning, competence and aptness of equipment. Today, the distinct advantages that rope access systems offer in terms of site accessibility for the inspection, testing and maintenance of industrial structures, mean that it is suitable to undertake major projects that may prove demanding for alternative access methods. This, together with its minimal effect on site operations and low environmental impact, an enviable safety record, reduced man-at-risk hours and the increased availability of certified, highly skilled rope access technicians, places industrial rope access in a competitive position and as a viable strategic choice.

REFERENCE

1. The Global Trends in Renewable Energy Investment 2018, jointly prepared by UN Environment's Economy Division, Frankfurt School-UNEP Collaborating Centre for Climate and Sustainable Energy Finance and Bloomberg New Energy Finance. ***JPCL***

Getty Images / Russell102

SSPC Coatings+ 2019: Events & Awards

The agenda for Coatings+ 2019, SSPC's rebranded annual conference and exhibition scheduled for Feb. 11 to 14, 2019 in Orlando, includes the annual SSPC awards luncheon and a number of other planned special events and activities.

All events will be held at Disney's Coronado Springs Resort unless otherwise noted. Complete information on the Coatings+ 2019 conference and exhibition is available at www.sspc2019.com.

PHIL CALVO MEMORIAL GOLF TOURNAMENT

Sunday, Feb. 10

Disney's Magnolia Golf Course

All proceeds for the second annual event in memory of the late Eagle Industries founder and former SSPC Board of Governors member Phil Calvo will go towards the SSPC Scholarship Fund. Registration is open and will be limited — sign up for a foursome today!

**Sponsorship opportunities are still available, including a Golf Ball Sponsor for $3,000, four Skill Prize Sponsors at $600 each and multiple Hole Sponsors at $500 each. For more information, please contact Nathan Wyman at wyman@sspc.org or 412-281-2331, ext. 2234.*

ANNUAL AWARDS LUNCHEON

Monday, Feb. 11, 11:30 a.m.–1:00pm

SSPC President Garry Manous, Executive Director Bill Worms and the Board of Governors will recognize the coatings industry's finest with the following honors.

The **SSPC Honorary Life Member Award** is given for extraordinary contribution and long-term activity on behalf of SSPC. To become an Honorary Life Member, an individual must be nominated by an SSPC Board member and approved by two-thirds of the Board. Only one Honorary Life Membership is awarded each year.

The **John D. Keane Award of Merit**, named after SSPC's executive director from 1957 to 1984, recognizes outstanding leadership and significant contribution to the development of the protective coatings industry and to SSPC.

The **SSPC Coatings Education Award** is given for significant development and dissemination of educational material and technical information related to protective coatings and their application.

The **SSPC Technical Achievement Award** is awarded for outstanding service, leadership and contribution to the SSPC technical committees.

The **Women in Coatings Impact Award**, established in 2014, recognizes women in the coatings industry who have helped create a positive impact on the culture of the industry.

The **President's Lecture Series Award** is presented to papers handpicked by the SSPC President and chosen for the reflection of the coatings industry and profession.

The **SSPC Outstanding Publication Award** is presented annually to the author(s) of the best technical paper or presentation from the SSPC conference 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 to vote on the award.

The ***JPCL* Editors' Awards**, selected from a field of more than 100 eligible *JPCL* articles published between May 2017 and July 2018, are voted on by *JPCL* readers and judged on significance to the industry among other criteria. The top article is awarded the *JPCL* Editors' Choice Award.

The **SSPC Outstanding Chapter Awards** are presented to 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.

The 13th annual **SSPC Structure Awards**, recognizing teams of contractors, designers, end users and other personnel for excellence and expertise demonstrated on industrial and commercial coatings projects, will also be presented at the luncheon. The Structure Awards categories include the William Johnson Award for a project demonstrating aesthetic merit in industrial coatings work; the E. Crone Knoy Award for commercial coatings work; the Charles G. Munger Award for a project demonstrating longevity of the original coating; the George Campbell Award for 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 industrial coatings work performed in a fixed shop facility; and the SSPC Coatings Industry Spirit Award for a coatings project that demonstrates extraordinary service benefitting a community or the industry at large. *JPCL* will feature award winners in 2019.

**At the luncheon, SSPC will also present a donation to the Adult Literacy League, which strives to build a literate community through tutoring and classes. For more information, visit www.adultliteracyleague.org.*

SSPC ANNUAL BUSINESS MEETING

Monday, Feb. 11, 2:30–3:00 p.m.

Following the Awards Luncheon, Garry Manous, Bill Worms and the Board will update SSPC members on the past year's performance and the Society's goals for the future.

WELCOME RECEPTION

Monday, Feb. 11, 5:30–7:30 p.m.

Sponsored by Carboline Company

Get your Coatings+ conference off to a good start by enjoying complimentary food and beverages — as well as life-sized "pong" games — at the Biergarten-themed opening party.

BREAKFAST KEYNOTE ADDRESS (NEW!)

"Demographics Is Human Analytics: Planning for What's Next," by Kenneth W. Gronbach

Tuesday, Feb. 12, 8:30–10:00 a.m.

Sponsored by Elcometer Inc.

Explore the fascinating realm of demography, which can seem to be both common sense and very counter-intuitive. How will workforces change? What is the future of

communications? Will big data change marketing and branding forever? What is the fate of mass media? What countries and continents are demographically positioned to excel?

FACILITY OWNERS' LUNCH AND PEER TECHNICAL DISCUSSION

Tuesday, Feb. 12, 11:30 a.m.–1:00 p.m.

Sponsored by IUPAT/FTI

As a thank-you for their commitment to SSPC standards and quality programs, facility owners are invited to a complimentary lunch followed by an open technical discussion on best practices and solutions related to industrial coatings. RSVP for this event is appreciated.

COATINGS+

OPEN QP COMMITTEE MEETINGS

Tuesday, Feb. 12, 10:30 a.m.–12:00 p.m. (QP 5); 1:00–2:00 p.m. (QP 1); 2:00–3:00 p.m. (QP 2)

SSPC technical committees with work in progress will meet to discuss the further development of standards, guidelines and best practices. All SSPC members are encouraged to join technical committees and contribute to the consensus process.

INTERNATIONAL CHAPTER MEETINGS: LATIN AMERICA AND ASIA PACIFIC

Tuesday, Feb. 12, 2:00–3:00 p.m.

SSPC's industry influence continues to grow internationally with the establishment of a number of new chapters around the world. Stop in and listen to what SSPC chapters abroad are up to.

STUDENT POSTER SESSION

Tuesday, Feb. 12, 3:00–4:00 p.m.
Wednesday, Feb. 13, 10:00–11:00 a.m.

Aligning with SSPC's efforts 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 and show off some of their recent research. Prizes will be awarded to the first-, second- and third-place posters.

EXHIBIT HALL GRAND OPENING

Tuesday, Feb. 12, 5:00–8:00 p.m.

Sponsored by The Sherwin-Williams Company

Watch Garry Manous cut the ribbon to the exhibit hall and be among the first to peruse the floor and enjoy complimentary food and drinks. Be sure to take a trip around the world and visit some of SSPC's international chapters — including the Brazil, China, Hampton Roads, Ecuador, Malaysia, Panama, Peru and Saudi Arabia chapters — in aisle 1200.

**As of press time, the Coatings+ 2019 Exhibit Hall is sold out! Please contact Nicole Lourette at lourette@sspc.org or 412-288-6023 with questions or for further information on the Coatings+ exhibit hall.*

MEGARUST MID-YEAR FOLLOW-UP

Wednesday, Feb. 13, 8:00 a.m.–12:00 p.m.

This annual follow-up meeting to the MegaRust Naval corrosion conference is designed to continue the discussions on key corrosion issues concerning the Navy, generate questions and talking points for potential presenters at the 2019 conference, and draft the conference theme and agenda. If interested in participating, please email megarust@navalengineers.org.

LUNCH WITH EXHIBITORS

Wednesday, Feb. 13, 11:30–1:00 p.m.

Sponsored by *CoatingsPro* Magazine

SSPC and industry sponsors will provide complimentary lunch tickets with your conference registration packet. The outdoor exhibit demonstrations area will also be open during regular exhibit hours.

PCS AND YOUNG PROFESSIONALS HAPPY HOUR

Wednesday, Feb. 13, 5:00–6:00 p.m.

Sponsored by PPG Protective & Marine Coatings

Join SSPC's Young Professionals group, as well as SSPC-certified Protective Coatings Specialists, for cocktails and conversation and to interact with both newcomers and industry veterans who are working to shape the future of the coatings industry.

CLOSING BLAST

Thursday, Feb. 14, 7:00–9:00 p.m.

Sponsored by LiUNA

Join your friends both new and old one last time before returning home. This year's reception features a Harley Davidson raffle giveaway! All attendees will receive a raffle ticket in their registration packets and must drop their tickets off at LiUNA's exhibit hall booth to enter. The winner will be chosen at random at the closing party and must be present to collect the prize.

SSPC Coatings+ 2019: Training & Certification Courses

Getty Images /ctdhygino

SSPC Coatings+ 2019 attendees can add to their protective coatings acumen by participating in any of the SSPC training and certification courses scheduled to take place during the conference and exhibition, Feb. 11 to 14, 2019 at Disney's Coronado Springs Resort in Orlando.

Registration for all SSPC training courses must be done separately from the Coatings+ conference registration. Individuals who register for a training course will receive a $100 discount on full conference registration. Download the Coatings+ 2019 training registration form at www.sspc2019.com/training or visit www.sspc.org/training to register by January 18, 2019. Please contact Phil Hall (hall@sspc.org; 412-281-2331, ext. 2241) with questions pertaining to Coatings+ 2019 training course registration.

The following is a list of the training and certification courses that will be offered at Coatings+ 2019. Please note that some course dates extend before or after the official conference dates. This list is preliminary; courses will not be confirmed until January 18, 2019.

For complete, up-to-date information on the SSPC Coatings+ 2019 conference and exhibition, visit www.sspc2019.com.

ABRASIVE BLASTING PROGRAM (C7)

Feb. 11–12

The C7 course teaches about dry abrasive blast cleaning of steel, covering the principles of surface preparation, surface cleanliness, surface profile, dust and debris control, and abrasives. A certificate of attendance will be given to those attending the lecture portion and observing the blaster demonstration.

AEROSPACE ENGINEER COATING APPLICATION TRAINING

Feb. 9–11

The objective of this course is to support corrosion prevention and control on DoD aircraft. It will explain how proper design is required to prevent corrosion; define the performance properties needed to qualify, validate and verify a coating for aircraft; and define military documents, specifications and requirements.

AEROSPACE MAINTAINER COATING APPLICATION TRAINING

Feb. 9–12

The course comprises multiple workshops and problem-solving exercises where participants can immediately apply their learning in a classroom setting, without the pressures of production and project schedules. Workshops include: Recognizing Types of Corrosion; Calculating Wet-Film Thickness Targets; Using a Product Data Sheet; Surface Preparation; Mixing; and Spray Application.

BASICS OF ESTIMATING INDUSTRIAL COATINGS PROJECTS (EST)

Feb. 13

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

BRIDGE COATINGS INSPECTOR PROGRAM (BCI)

Feb. 10–14 (Level 1);
Feb. 10–15 (Level 2)

COATINGS+

BCI teaches the fundamentals of how to inspect surface preparation and coating application on bridge steel. It covers unique situations that will affect inspection in the field, as well as the skills required to inspect both new, shop-applied coatings and maintenance systems from the field.

COAST GUARD BASIC PAINT INSPECTOR COURSE (COAST GUARD)

Feb. 10–14

This five-day inspection course was developed to train coatings inspectors in the duties and responsibilities involved in inspecting surface preparation and application for the U.S. Coast Guard.

COATING APPLICATION SPECIALIST REFRESHER (CAS REF)

Feb. 9

The CAS Refresher gives an overview of surface preparation and application covered in the Body of Knowledge of SSPC-ACS I/NACE No. 13 Applicator Certification Standard No. 1 Industrial Coating and Lining Application Specialist Qualification and Certification. It is especially designed for entry-level employees new to the coatings Industry.

COATING APPLICATION SPECIALIST (CAS)

Feb. 10 (Level 1);
Feb. 10–11 (Level 2)

Level I of the CAS program is intended for entry-level/trainee application specialists and consists of a one-hour written exam. Level 2 certification requires passing a closed-book written exam and hands-on testing that certifies proficiency in abrasive blasting and coating application using conventional or airless spray.

CONCRETE COATING INSPECTOR PROGRAM (CCI)

Feb. 10–13 (Level 1);
Feb. 10–14 (Level 2)

This course covers the proper methods of inspecting surface preparation and coating application on concrete industrial structures. It will also outline the skills required to conduct and explain the steps needed when measuring moisture in accordance with relevant ASTM testing methods.

*Please call SSPC (412-281-2331) to register for this course. The online Concrete Coatings Basics (CCB) courses must be completed before registering for CCI Levels I and 2.

EVALUATING COMMON COATING CONTRACT CLAUSES (CONTRACT)

Feb. 10

This course provides 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.

FLOOR COATING BASICS (C10)

Feb. 10–11

This course is designed to satisfy SSPC-QP 8 Section 4.4, which requires each job crew chief and each QC manager to complete a minimum two-day overview of concrete components, coating and surfacing types, and surface preparation and substrate repair techniques based on SSPC-Guide 20, "Procedures for Applying Thick Film Coatings and Surfacings Over Concrete Floors."

FUNDAMENTALS OF PROTECTIVE COATINGS (C1)

Feb. 10–14

CI provides a practical and comprehensive overview for those who are new to the protective coatings industry. It is also an ideal review of the fundamentals of corrosion and the use of coatings for protection against corrosion and deterioration of industrial structures.

GROUND VEHICLE CORROSION/ PROTECTIVE COATINGS COURSE

Feb. 10–14

This five-day training targets Depot personnel responsible for maintaining equipment, vehicles and structures through the use of protective coatings, as well as participants

in the Depot's Corrosion Control Program. It provides the basic knowledge and skills to assess corrosion, select surface preparation methods and protective coating systems, and become familiar with NSTM Chapter 631.

INDUSTRIAL COATINGS SAFETY MANAGEMENT (SAFETY)

Feb. 10–12

This three-day training discusses how to manage a safety and health program in industrial painting operations. The course will be delivered in 16 units featuring lecture, participant engagement exercises and workshops. Participants will complete daily homework that will serve as both a review of material and preparation for the 50-question final exam.

INSPECTING CONTAINMENT (CONTAINMENT)

Feb. 15

This course teaches inspectors how to ensure that the surface preparation and debris collection methods employed match the containment requirements and minimize or prevent emissions from escaping the work area. It also reviews how the inspector verifies the amount of emissions escaping from a containment area.

INSPECTION PLANNING AND DOCUMENTATION (INSPEC PLAN)

Feb. 10–11

This two-day course helps inspectors effectively plan inspections before work starts and accurately document results after work begins. The training will emphasize carefully reviewing plans and specifications and using forms to accurately and legibly document project-specific inspection and test results, as well as non-conforming work and rework.

LEAD/HAZARDOUS COATINGS REMOVAL (C3)

Feb. 12–15

The C3 course covers the hazards of lead and other toxic metals and the current legal and regulatory environment. Topics include worker protection, compliance with regulations and specifications, waste stream management, insurance and bonding issues, and an introduction to other environmental, safety and health issues.

LEAD/HAZARDOUS COATINGS REMOVAL REFRESHER (C5)

Feb. 12

This one-day course provides a review of Competent Person duties and responsibilities in working with lead and other hazardous materials encountered in industrial coatings work. It also reviews relevant OSHA and EPA regulations.

NAVIGATING NAVSEA STANDARD ITEM 009-32 (00932)

Feb. 9

This one-day course describes the naval ship cleaning and painting requirements found in NAVSEA 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.

NAVSEA BASIC PAINT INSPECTOR (NBPI)

Feb. 10–14

Developed by Naval Sea Systems Command (NAVSEA), this course teaches inspection of the critical coated areas as defined by US Navy policy documents such as cofferdams, aviation decks, chain lockers, underwater hull, tanks and others. It provides both the technical and practical fundamentals for coating inspection work for many steel structure projects other than ships.

PLANNING AND SPECIFYING INDUSTRIAL COATINGS PROJECTS (C2)

Feb. 10–14

This course provides an overview of the principles of planning, awarding and monitoring the quality of new construction or maintenance painting projects. Participants will become familiar with the necessary tools to develop effective coating projects and play a more active role in managing painting projects to successful completion.

PROJECT MANAGEMENT FOR THE INDUSTRIAL PAINTING CONTRACTOR (PRO MGMT)

Feb. 11–12

This course introduces the project management concepts used on industrial painting projects. Those new to project management or interested in becoming project managers can learn more about generating new business, reviewing contracts, navigating employee relations and building safety into the job.

PROTECTIVE COATINGS SPECIALIST PROGRAM (PCS)

Feb. 15

The PCS program awards recognition to individuals who have in-depth knowledge in the principles and practices of industrial coatings technology. SSPC's highest level of certification, the PCS designation attests to the professional credibility of the coatings practitioner and raises the standards of the profession.

PROTECTIVE COATINGS INSPECTOR PROGRAM (PCI)

Feb. 9–13 (Level 1);
Feb. 9–14 (Level 2);
Feb. 15 (Level 3 Exam)

The PCI program thoroughly trains individuals in the proper methods of inspecting surface preparation and coatings installation 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 meets the requirements of ASTM D3276; the IMO Performance Standard for Protective Coatings; and IACS CSR.

QUALITY CONTROL SUPERVISOR (QCS)

Feb. 13–14

This course provides training in quality management for SSPC-certified contractor personnel, technical quality managers and inspectors employed by SSPC-QP 5 inspection firms. It is highly recommended that participants have recent inspection training (SSPC PCI, NBPI or BCI) or some quality control experience. This course is not intended to replace the more formal quality management courses available from such organizations as the American Society for Quality (ASQ).

SELECTION OF COATINGS (SELECT CTGS)

Feb. 15

This course outlines the skills required to specify and select coatings for specific structures and environments. It defines the primary functions of a coating, the types of substrates that are painted and the demands of the environment.

SPRAY APPLICATION CERTIFICATION (C12)

Feb. 12–13

This program assesses the skills of sprayers who have a minimum of 800 hours applying protective coatings with airless/conventional spray in an industrial or marine environment. Candidates are certified through a brief written exam and a practical hands-on skill assessment.

THERMAL SPRAY INSPECTOR TRAINING (THERMAL INSP)

Feb. 14

This program covers the inspection of thermal spray from pre-surface preparation through coating application.

THERMAL SPRAY APPLICATOR TRAINING (THERMAL APP)

Feb. 13

This course is designed to train and certify applicators of thermal spray coatings to industrial substrates. Students who do not want to receive the certification can attend the one-day lecture and classroom workshops to receive a certificate of training.

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TRAIN THE TRAINER (TTT) / TRAINTHEPAINTER (TTP)

Feb. 9–10

This two-day class prepares a company's internal trainer(s) to deliver the SSPC Trainthepainter (TTP) Program to their internal craft workers.

USING SSPC-PA 2 EFFECTIVELY (PA 2) / USANDO SSPC-PA 2 EFECTIVAMENTE (PA 2)

Feb. 15

This course explains the key aspects of SSPC-PA 2, "Measurement of Dry Coating Thickness with Magnetic Gauges." Students learn to verify the accuracy of a DFT magnetic gage; measure the DFT of a coating with Type I or Type 2 gauges; and describe/implement the procedure to determine if the film thickness in a given area conforms to the specification.

*In addition to the standard English-language course, SSPC is excited to offer its PA 2 course for the first time in Spanish.

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SSPC Coatings+ 2019: Technical Program

The Coatings+ 2019 technical program will feature presentations from a variety of speakers representing different industry sectors. The following is a list of scheduled presentations, current as of press time. For an official schedule, refer to the Coatings+ 2019 On-Site Guide.

MONDAY, FEB. 11

MORNING 8:30–11:30 A.M.

Session 1: ABCs of QP

• "Benefits of QP," by Henry Arato and Brent Miller, SSPC; Cory Allen, Vulcan Painters; and Contractors TBD; 8:30–11:30 a.m.

This breakout will expose attendees to the benefits of the QP certification programs. SSPC staff will outline the QP program and answer questions you may have on the overall process. An informative, hands-on workshop on root cause analysis and corrective actions will take place. Lastly, contractors will give testimonials as to why they are QP-certified and the benefits of the program.

Session 2: Quality in a Developing Workforce

• "Assuring Quality with Certified Coating Contractors, Applicators and Inspectors," by Troy Fraebel, ABKaelin, LLC; 8:30–9:00 a.m.

The presenter will explore the differences between quality management, quality assurance, quality control and inspection; describe the consequences of insufficient QA; list the elements of a quality management system; identify organizations responsible for certifying coating contractors and inspectors and the different certification levels; and explain how to specify the appropriate level of certification.

• "Discover SSPC's Trainthepainter Program," by Jennifer Buzzatto, SSPC; 9:00–9:30 a.m.

Learn about SSPC's craft worker training program, Trainthepainter (TTP), and how it could be beneficial to your team. The presenter will outline the curriculum, what distinguishes TTP from other programs and the pathway to certification, as this training will prepare workers for other SSPC certification level exams.

• "Bringing Coatings to Our Youth," by Dontrae Walls, Newport News Shipbuilding; 9:30–11:00 a.m.

This session will open with a fun ice-breaking activity between the speakers and students, followed by a presentation on the basics of coatings, coatings history, how coatings are used today, and potential wages at different industry levels, followed by a Q&A session. Finally, students will team up to perform a coating project.

Session 3: Case Studies

• "Accelerating Construction in Sewer Collection: Madison CMIC Pump Station #1: A Case Study," by Eric Zimmerman, The Sherwin Williams Company; and Jennifer Sloan-Ziegler, PhD, P.E., Waggoner Engineering; 8:30–9:00 a.m.

A major pump station exhibited severe degradation, and rehabilitation employed innovative coating technologies that offered the ability to apply corrosion-resistant linings over green concrete structures. The presenters will outline the project and the advantages of urethane concrete technologies as well as hydrogen-sulfide-resistant, 100-percent-solids epoxy coatings for use in wastewater applications.

• "The Importance of Routine/Timely Maintenance of Water Storage Tanks," by Gregory "Chip" Stein, Tank Industry Consultants; 9:00–9:30 a.m.

The decision to repair and repaint a water storage tank requires careful consideration. This presentation will showcase actual case studies to discuss why routine, timely tank rehabilitation is important to responsible asset management, as well as the possible ramifications of not performing routine maintenance.

• "Enhanced Corrosion Protection and Increased Service Life of Powder Coated Parts on Sea Vessels," by Chris Lucy, ChemQuest; 9:30–10:00 a.m.

The presenter will compare non-phosphate, environmentally friendly pre-treatments on various substrates in shipyards and discuss how integrating a chemical pre-treatment system into the process can enhance performance and reduce corrosion, ultimately extending coating service life and reducing scheduled maintenance.

• "Corrosion Under Insulation Management," by David A. Hunter, Pond & Co.; 10:00–10:30 a.m.

This presentation recaps the investigation of vessel tank failures that were causing recurring maintenance costs of $250,000 per year. This challenging project had space and cost limitations, operational time pressures,

vessel availability requirements and replacement variables.

Session 4: Environmental, Health & Safety

• "Regulatory Update: New and Revised Regulations and Actions Affecting the Coatings Industry," by Alison Kaelin, ABKaelin, LLC; 8:30–9:00 a.m.

This annual update provides information on regulatory issues affecting SSPC members and the coatings industry, including enforcement of the new silica and beryllium OSHA standards and the EPA hazardous waste regulations.

• "Warning! Technical Challenges of Compliance with the New CA Proposition 65 Regulations," by Kim Reynolds Reid, Gradient; 9:00–9:30 a.m.

Compliance with California's Prop 65 regulations became even more complicated when the new Clear and Reasonable Warning labeling rules took effect in August of 2018. This presentation will provide a brief overview of the recent changes and explore some of the legal consequences associated with non-compliance.

• "The Rebranding of a Safety Culture," by Christopher Peightal, KTA-Tator, Inc.; 9:30–10:00 a.m.

Whether we choose to recognize it or not, every company has a safety culture that continuously changes, and even rebrands itself from time to time. This presentation will illustrate the process of rebranding of a safety culture.

• "Corrosion Protection & Safety Assurance – Understanding Hazardous Location Conduit Systems for Safety & Performance," by Stephanie Ellis and Steve Voelzke, Robroy Industries; 10:00–10:30 a.m.

This presentation will discuss validation of coating adhesion, applicable standards and listings for conduit systems within corrosive and hazardous locations, as well as how to validate that products within a hazardous location are listed and the test methods to which they are subjected.

AFTERNOON 1:30–5:00 P.M.

Session 1: Workshop

• "Basic Coatings Inspection Instrument Use," by Bill Corbett, KTA-Tator, Inc.; 1:30–4:30 p.m.

Ideal for entry-level staff, this workshop gets back to the basics of instrument use. Participants will use basic instrumentation for assessing illumination, ambient conditions, surface temperature, profile, cleanliness, soluble salt content, dry film thickness and more.

Session 2: Workshop

• "Considerations When Specifying Protective Coatings," by Charles Brown, Chris Farschon and Frank Rea, GPI.; 1:30–4:30 p.m.

This workshop will provide an overview of an industrial protective coatings project, including design considerations, material selection, surface preparation, and basic quality control techniques. Presenters will review typical inspection instruments, surface preparation guides, how to read a product data sheet and more.

Session 3: Workshop

• "SSPC Instructor Workshop," by Anne McHenry and Jennifer Buzzatto, SSPC; 1:30–4:30 p.m.

Focused around learning styles and strategies for instructing, this workshop will strengthen your abilities as an instructor to better utilize classroom time and engage students throughout the learning process.

Session 4: Concrete

• "Surface Preparation and Concrete: Compliance with the Silica Standard," by Sylvia Fontes, Forensic Analytical; 1:30–2:00 p.m.

This presentation will highlight key provisions of the new Silica in Construction Standard and its relationship to the various surface prep methods being used, such as those outlined in SSPC SP-13/NACE 6 "Surface Preparation of Concrete."

• "Texture Standards for Concrete Coatings," by Tom Murphy, VP Marketing; 2:00–2:30 p.m.

SSPC has developed a standard to classify degrees of concrete coating texture to facilitate communication during specification and installation. This presentation will summarize the texture classification and tactile coupons defined by the standard.

• "Bring on the Heat: A Novel Technique to Assess Thick-Film Thermoset Plural Component Coating

Application," by Dudley Primeaux II, Primeaux Associates, LLC; 2:30–3:00 p.m.

The presenter will discuss the use of thermal imaging, or infrared thermography, to evaluate the application of plural component, 100-percent-solids thermoset coating systems, which can provide for guidance in consistent application film thickness of these coating systems.

• "'Clearing the Hurdles' – A Look at the South Valley Sewer District, Jordan Basin Water Reclamation Facility Membrane Basins Rehabilitation Project," by Greg Hansen, The Sherwin-Williams Company; 3:00–3:30 p.m.

This presentation will outline the rehabilitation efforts taken after severe degradation of concrete membrane basins at a water reclamation facility, including moisture-vapor transmission concerns, resurfacing contaminated concrete, avoiding the possibility of the coating system damaging the membranes, installation windows and 100-percent-solids coating technologies.

• "Don't Forget the Details When Preparing and Coating Concrete," by John Sierzega and Sean M. Meracle, The Sherwin-Williams Company; 3:30–4:00 p.m.

The presenters will go over proper surface preparation of concrete and details that are missed, including protrusions, joints and terminations. ICRI standards, SSPC-SP 13 and pitfalls of some preparation methods will also be discussed, with an emphasis on preventing failures.

• "Measuring Vertical Concrete Surface pH for High-Performance Protective Linings: Test Method for Severe Service Exposures," by Vaughn O'Dea, Tnemec Co., Inc.; 4:00–4:30 p.m.

The presenter will review acid attack of vertical concrete, discuss the importance of in situ pH measurements prior to topcoating, review existing pH measurement test methods and respective limitations, and present a novel test method for vertical concrete pH measurements.

• "1K and 2K Waterborne Coatings for Concrete Pavers: Color 'Pop' with Enhanced Durability," by Jay Johnston, Covestro, LLC; 4:30–5:00 p.m.

In this presentation, a state-of-the-art, two-component waterborne polyurethane coating will be compared to a one-component polyurethane coating, a solvent-borne acrylic coating and a waterborne acrylic coating on concrete. The coatings will be assessed for color "pop," and abrasion, chemical and UV resistance.

TUESDAY, FEB. 12

MORNING 10:30–12:30 P.M.

Session 1: Failure Panel

• "Exploring Differing Views on Causes of Coating Failures," moderated by Dudley Primeaux, Primeaux Associates LLC; with panelists Charles Harvilicz, Newport News Shipbuilding; Chris Farschon, GPI; and Gunnar Ackx, Scicon Worldwide; 10:30 a.m.–12:30 p.m.

Scenario to be announced!

Session 2: Coating Application

• "Dry Film Thickness: Is More Coating Always Better?" by Robert Francis, R A Francis Consulting Services; 10:30–11:00 a.m.

This presentation will look at durability figures

of common coating systems for atmospheric and immersion exposure as a function of dry film thickness and offers some practical hints for ensuring coverage of edges and corners when applying coatings at lower thicknesses.

• "Forced Cure of Applied Linings," by Shawn Evans, The Sherwin Williams Company; 11:00–11:30 a.m.

The practice of induced heat to decontaminate a tank that has been in previous service for relining or the post-application heat curing of an applied lining may be considered a lost art within the industry. This presentation will inform or remind attendees of the requirements and benefits to these processes.

• "The Advantages of 100% Solids Polyurethane vs. 100% Solids Epoxy in Steel Potable Water Storage Tanks," by Murray Heywood, The Sherwin-Williams Company; 11:30 a.m.–12:00 p.m.

If you are an owner or engineer that has not switched to 100-percent-solids technology and are considering a change in direction, or if you traditionally specify 100-percent-solids epoxy, this session will offer new insights into the advantages of considering elastomeric polyurethane lining technology.

• "Effect of Feathering on Coating Performance," by Patrick Cassidy, Elzly Technology Corporation; 12:00–12:30 p.m.

The Navy currently requires feathering of intact paint when performing repair or touch-up coating work. The presenter will explain basic feathering methods, its impact on surface preparation, and how it can impact the performance of a coating system, saving money and up to 20 percent of overall production time.

Session 3: Coating Types, Part 1

• "Mechanical Performance of Nano-particles Enriched Zinc-Rich Coatings," by Saiada Fuadi Fancy, Florida International University; 10:30–11:00 a.m.

This presentation will evaluate the mechanical performance of a nanoparticle-enriched zinc rich epoxy coating (NPE-ZRP) system in different exposure environments. Samples were exposed to outdoor and laboratory exposure, after which coating tensile pull-off strength was measured and visual and cross-sectional micro-graphic analyses were assessed.

• "Novel Isocyanate-Free Resins for Ik and 2k Protective Coatings," by Marcelo Herszenhaut, Hexion Research Belgium SA; 11:00–11:30 a.m.

This presentation will introduce a new family of polymers that combine neoacid esters and alkoxysilane monomers to produce high-solids polymers to formulate into 1- and 2-K protective coatings. These coatings were compared with 2K polyurethane and acrylic siloxane systems for usual performance parameters.

• "Field Evaluation of Coatings for Mussel Control: 10-Year Update," by Stephanie Prochaska and Allen Skaja, U.S. Bureau of Reclamation; 11:30 a.m.–12:00 p.m.

For the past 10 years, Reclamation has been evaluating commercially-available antifouling and foul-release coatings to deter mussel fouling. The presenters will outline test results on newly formulated and existing commercial coatings, as well as experimental coatings under material transfer agreements (MTAs).

• "The Benefits and Use of Fluoropolymer Coatings," by Eric Brandhorst, The Sherwin-Williams Company; 12:00–12:30 p.m.

The presenter will dive into the chemistry of two primary types of fluoropolymer resins utilized in the protective and architectural coatings markets and explore the mechanisms by which they provide improved exterior durability in specific applications.

Session 4: Nuclear: Cooling Water Pipelines (Sponsored by EPRI)

• "Novel Multifunctional Surface Treatments for In-Situ Improvement of Heat Exchanger Performance," by Dr. Vinod Veedu, Oceanit Laboratories, Inc.; 10:30–11:00 a.m.

This presentation will highlight the potential of a novel surface treatment that blends the repellent behavior of nanomaterial thin coatings with the durability of epoxy resins in order to preserve the heat transfer rate and efficiency of heat exchangers in power plants.

• "Nanoscale Carbon Composite Matrix Coatings," by Joe Davis, Tesla NanoCoatings; 11:00–11:30 a.m.

The presenter will demonstrate how a new approach to galvanic corrosion protection is more effective and greener for the environment and explain why more and more end users across industry sectors are moving towards this effective technological breakthrough.

• "Hydrophobic Coatings: Water is No Match for Me," by John A. Peters, Framatome; 11:30 a.m.–12:00 p.m.

This presentation will summarize efforts to reduce radioactive contaminants on plant equipment and vendor-supplied tooling through the use of superhydrophobic coatings, as a potential cost savings within the nuclear industry.

AFTERNOON, 1:30–4:30 P.M.

Session 1: Workshop

• "ESCAPE ROOM: Interactive Coating Failure Investigation," by Valerie Sherbondy and Rick Huntley, KTA-Tator, Inc.; 1:30–4:30 p.m.

This presentation will allow the attendees to act as investigators to determine what went wrong, and who is ultimately at fault. Audience participation is vital to the success of the workshop and participants are encouraged to work individually or in teams to try to solve the puzzle

.

Session 2: Surface Preparation of Steel

• "On the Effect of Abrasive Blast Media on Corrosion of Steel," by Carl Reed, GPI; 1:30–2:00 p.m.

In this follow up to an SSPC 2018 presentation, panels are abrasive blasted with four different blast medias, coated with an epoxy coating and subjected to a corrosive environment to investigate the what effect these blast medias may have on corrosion of the steel.

• "Introducing Peak Count Density Variable to the Surface Preparation of Galvanized Steel," by Yanick Croteau, The Sherwin Williams Company; 2:00–2:30 p.m.

This presentation will explore the different abrasive media for surface preparation of galvanized steel, evaluating the peak count density and coating adhesion in an attempt to find optimal peak count for optimal adhesion.

• "Effects of Additional Waterjet Cleaning on the Surface Cleanliness and Coating Performance," by HeeBaek Lee, Hyundai Heavy Industries; 2:30–3:00 p.m.

The presenter will provide optimization of the surface treatment criteria through the coating performance test in accordance with ISO 12944, analysis of process problems according to additional waterjet cleaning work prior to blasting, and a comparison of coating performance with or without additional waterjet cleaning.

• "Pipeline Internal Surface Preparation and Quality Control Testing," by Kristopher Kemper, SSPC; 3:00–3:30 p.m.

One of the most challenging areas for pipelines is removal of previously applied protective coatings and the re-application of coatings for interiors. This presentation will review a multi-year project involving an automated system for surface preparation and coating application.

• "Abrasive Selection Economics: Cost or Price?" by Brad Gooden, BlastOne International; 3:30–4:00 p.m.

This presentation will help attendees increase project profitability through the right selection of abrasives. It will cover the characteristics of different abrasive types and what effect they can have on coating life and provide an update on the latest laws and regulations.

• "Navigating New Classifications for Wet Abrasive Equipment," by Wade Hannon, Graco, Inc.; 4:00–4:30 p.m.

The presenter will provide an overview of the three main types of wet abrasive blasting: wet blasting, slurry blasting and fluidized abrasive blasting, along with a brief history of each technique and the advantages and disadvantages of each.

Session 3: Navy/Marine

• "Coating Performance Over Localized/Partially Abrasive Blasted Surfaces," by Patrick Cassidy, Elzly Technology Corporation; 2:30–3:30 p.m.

The focus of this presentation will be to introduce the Navy concept of partial/localized abrasive blasting preparation to the industrial coatings community and discuss test results (both laboratory and shipboard), technical challenges, cost savings, expected service life and way forward.

• "The Development of Water-based Peelable Paint for Reduction of Repair Coating Process," by SeungGon Choo, Hyundai Heavy Industries; 3:30–4:00 p.m.

This presentation will introduce a water-based peelable paint developed using a chemically superior polyurethane dispersion polymer. The newly developed paint showed stable film performance, good weathering resistance and reduced recoating intervals.

• "Partnering with the U.S. Navy: A Guide to Effective, Long-Term Water Storage Tank Maintenance on a Global Scale," by Gregory "Chip" Stein, Tank Industry Consultants; 4:00–4:30 p.m.

This presentation will discuss the keys to a successful, long-term partnership with the U.S. Navy from both the engineer's and owner's points of view, and how these same critical components of the relationship can benefit all water tank owners.

Session 4: Inspection

• "Performance of Autonomous Aerial Robotics for Dry Film Thickness Measurement," by Jamie Branch, Apellix, Working Drones, Inc.; 1:30–2:00 p.m.

The presenter will introduce the audience to aerial robotics and its application to the coatings industry; evaluate performance of aerial robotic systems used for DFT measurements; and discuss applications and limitations of aerial robotic technology in the coatings industry.

• "How Have the Latest Instrument Developments Changed the Way We Measure Profile?" by David Barnes, Elcometer Limited; 2:00–2:30 p.m.

This presentation will discuss the potential impact recent instrument developments can have on the measurement of profile both positive and negative and the benefits to the inspector in terms of the improved efficiency available in completing an inspection.

• "Calibration, Verification, and Adjustment: Ensuring Accurate Inspection Measurement," by David Beamish, DeFelsko Corp.; 2:30–3:00 p.m.

This presentation will help attendees understand the meaning of the word "calibration" as it pertains to coating inspection equipment and discuss the differences in documentation, including Certificates of Calibration and Certificates of Accuracy, as well as steps to ensure best DFT accuracy.

• "Building Success Through In-field Reporting," by Justin Rigby, DocoPro; 3:00-3:30 p.m.

This presentation will help attendees build communication between managers and site staff, develop better quality reporting techniques, and reduce cost and frequency of repairs and re-work.

• "Considering Overcoating? Details to Examine," by William Seavy and Tim Davis, The Sherwin-Williams Company; 3:30–4:00 p.m.

The presenter will look into the many factors that need to be considered when making the decision to over coat an existing coating system. Topics to be discussed will include industry standards, DFT readings, overall condition of the current system, visibility, criticality and other factors.

WEDNESDAY, FEB. 13

MORNING 8:30–9:30 A.M.

Session 1: Mini Session

"Maintenance Prioritization of Aging NASA Wind Tunnels," by Robert Ernsting, Jacobs Engineering; Adam Beers, KTA-Tator, Inc.; and David Shinn, NASA Langley Research Center; 8:30–9:30 a.m.

COATINGS+

This presentation will discuss an innovative technique employed during a study conducted on NASA wind tunnel facilities. With some wind tunnels exceeding 70 years in age, the study is crucial to integrating and prioritizing limited funding appropriation and maintenance planning for each of these important national assets.

Session 2: Mini Session

• "Is Your Specification Style Costing Your Customers Money? Providing Better Value Through Changing One Factor in Your Specification," by John Hilton, The Sherwin-Williams Company; 8:30–9:00 a.m.

The presenter will contend that changing the specification style to include at least three coating manufacturers by product can provide a more cost-controlled product to the owner.

• "That Sounds Great, But How Long Will It Last?" by Chuck Fite, The Sherwin-Williams Company; and Jeremy Sukola, PPG Protective & Marine Coatings; 9:00–9:30 a.m.

This presentation will offer a more reliable approach to providing an owner or specifier with a true anticipated service life for a protective coating system based on evaluating service life conditions, choosing appropriate industry standard surface preparation methods and selecting the proper material chemistries.

Session 3: Mini Session

• "Does PA 2 Go Far Enough in Outlining DFT Measurement and Assisting the User to Carry Out the Most Efficient Inspection?" by David Barnes, Elcometer Limited; 8:30–9:30 a.m.

The presenter will look at the implications of using the scanning DFT method, its potential benefits and how standards should reflect the availability of this technology to enhance the options available to contractors and inspectors.

Session 4: Mini Session

• "Writing an Effective Scope of Work is Just Smart Business," by Russell Brown, Polygon Group; 8:30–9:30 a.m.

A statement of work is an important part of project and contract management that helps guarantee that the work for a project will be done according to certain guidelines and expectations. This presentation will help participants learn how to overcome common challenges and create a solid SOW for the blast and coatings industry.

MID-MORNING 10:00 A.M.–12:00 P.M.

Session 1: Bridge

• "Integrating Steel Repairs on Bridge Painting Projects," by Kevin Keith, The LiRo Group; 10:00 a.m.–12:00 p.m.

This presentation will discuss the process of installing steel repairs and painting a bridge at the same time. It will include lessons learned by a resident engineer with experience managing major bridge painting and steel repair contracts.

• "Remediation of Soluble Salts from Steel Bridges During Repainting," by Pete Ault and Nick Fabritiis, Elzly Technology Corp.; 10:30–11:00 a.m.

The presenters will show data on commercially used soluble salt remediation techniques evaluated in a laboratory setting. The reduction in

soluble salts was measured for each technique, and natural and accelerated test performance of coatings over a series of rusted-then-remediated test panels will be presented

Session 2: Fireproofing

• "Selecting the Right Primers on Galvanized Surfaces Protected by IFRM," by Ernst Toussaint, Hilti North America; 10:00–10:30 a.m.

This presentation will cover the surface preparations standards involved in preparing hot dipped galvanized surfaces for primer application; adhesion tests used to determine the compatibility of IFRM to primers; how to determine the mass of steel members and how that is used to obtain thickness measurements of the IFRM and more.

• "Intumescent Coatings and Bridges: How Not to Get Burned," by Max Tritremmel, PCS, Ahern Painting Contractors, Inc.; 10:30–11:00 a.m.

The presenter will explore the factors involved in the selection, application and measurement of intumescent coating application and the constraints and complexities that come with installing these on bridge structures, using real-world examples involving access, traffic maintenance and protection, preparation and application.

• "What You Always Wanted to Know About Fireproofing," by Benjamin Fultz, Bechtel Corp.; 11:00–11:30 a.m.

In this presentation, generic types of fireproofing, standards governing use, application limitations and the difference between fireproofing and fire-resistant materials will be discussed.

• "Improving Surface Preparation for Fireproofing Application," by Jeff Bogran, TechnoFink; 11:30 a.m.–12:00 p.m.

Session 3: Coating Types, Part 2

• "Penny Wise or Pound Foolish? Holding Primers for Solvent Free Tank Linings," by Mike O'Donoghue and Vijay Datta, International Paint, LLC; and Margaret Pardy, Mag Consulting, Inc.; 10:00–10:30 a.m.

This presentation will examine the productivity and cost and performance issues of using a thin-film, solvent-borne holding primer with single-coat solvent-free linings. Blast profiles, pitted steel characteristics, holidays in the linings, times to complete lining applications and the proper choice of the holding primer will be examined.

• "Fast-Cure Without Compromise: Enhanced Productivity through Fast-Cure, High-Performance Coatings," by Mary Roley, Carboline Company; 10:30–11:00 a.m.

The presenter will give an overview of today's coating landscape and trends related to fast-cure, weatherable coatings, with examples of new technologies available that offer high performance, fast cure and quick return to service.

• "Myth Busters: Superhydrophobic Additives for Coatings," by Allen Skaja, U.S. Bureau of Reclamation; 11:00–11:30 a.m.

Superhydrophobic additives have been a hot topic for increasing water repellency. The presenter will show results of a laboratory comparison with and without a superhydrophobic additive in four different coating systems to determine if there is a corrosion protection benefit.

• "The Use of VCI Inhibitors in Conjunction with or Replacement of Traditional Corrosion Inhibitors," by Markus Bieber, Cortec Corporation; 11:30a.m.–12:00 p.m.

The presenter will introduce alternative corrosion inhibitor technologies, provide test data showing the effectiveness of these alternative technologies, and explore synergies between existing technologies and these alternatives.

• "Corrosion Protection Systems Based on Lamellar Zinc Pigments," by Guy Decelles, ECKART Suisse SA; 12:00–12:30 p.m.

This presentation will show results of a study using three coating systems, each including a zinc-rich epoxy primer based on spherical (dust), lamellar (flake) and a mixture of lamellar and spherical morphologies. Result indicates a better zinc-rich paint system when using lamellar zinc for a category of C5-M exposure.

Session 4: Coating Failures

• "Mitigation of MIC of Steel in Marine Fouling Environments with Coatings," by Samanbar Permeh, Florida International University; 10:00–10:30 a.m.

The presenter will show research studying the performance of antifouling and polyurea-based coatings in preventing MIC of submerged steel. Laboratory testing and field examination were used to evaluate the applicability of polyurea and water-based antifouling coatings to enhance environmental resistance to biodeterioration.

• "Investigation of Transport and Installation Damages to Coatings of Offshore Structures," by Tom Marquardt, Muehlhan AG; 10:30–11:00 a.m.

This presentation will study the corrosion-protection performance of offshore splash-zone coating systems against mechanical stresses, as well as how the performance of a coating system might change and the lessons that can be learned from statistical investigations.

• "Elastomeric Coating: A Failure Analysis Using Heat and Water Submersion," by Nizar Alrafie, GHD, Inc.; 11:00–11:30 a.m.

Elastomeric coatings have been broadly used since the 1950s, but instructions for elastomeric application are largely based on laboratory test conditions rather than extreme field conditions. This presentation will examine coating failures in a typical hot, humid South Florida environment.

• "A Breakdown of the System," by Terry L. Gabbert, USAF Corrosion Prevention and Control Office; 11:30 a.m.–12:00 p.m.

How does one identify coating defects and failures? Environmental agents, ultraviolet light and corrosive fluids are just a few examples of contributing factors that engineers and maintainers should be concerned with. What are the requirements of a proper inspection and test plan? These are areas that will be addressed.

AFTERNOON 3:00–5:00 P.M.

Session 1: Workshop

• "Leadership Session," sponsored by the SSPC Women in Coatings group; 3:00–5:00 p.m.

This leadership session will involve industry leaders presenting on influential and educational topics. Please join us for good discussion and refreshments.

Session 2: Shipyard Ventilation

• "Lessons Learned from Dehumidification Specifications, Good and Bad," by Don Schnell, Polygon Group; 3:00–3:30 p.m.

This presentation will detail some of the aspects of dehumidification specifications that have caused trouble for the owner, the specifier and the contractor for various reasons. The technical and economic impacts will be discussed as well as possible solutions.

• "Choosing the Right Technology to Control Climates in Drydockings: Some Trials and Some Errors," by Nick Kline, Polygon Group; 3:30–4:00 p.m.

The presenter will discuss how various approaches to climate control have been used and misused. Included will be details on how various combinations of desiccant dehumidification, heating and cooling equipment have been utilized properly and some examples of when things did not work out so well.

• "Dust Collection and Ventilation," by Mark LaPlante, Entech Industries; 4:00–4:30 p.m.

Technologies and methods for ventilating surface preparation operations in shipyards have improved over recent years, along with industry knowledge of the basics of airflow, VOC removal and measurement. The presenter will discuss how some of these innovations have come to be and some of the lessons learned along the way.

• "Containments and Climate Control for Non-Skid Deck Coatings," by Scott Eisel, International Flooring & Protective Coatings, Inc.; 4:30–5:00 p.m.

Creating environments for the application of non-skid coatings on flight decks has become a sophisticated and complex endeavor. The presenter will outline some of the methods used and explain why various approaches work well and others do not.

• "Measuring and Monitoring," by Kevin Phillips, Huntington Ingalls Industries–Newport News Shipbuilding; 5:00–5:30 p.m.

This presentation will cover some of the experiences in shipyard coating applications that have led to today's best practices for monitoring and documenting conditions, the use of blended climate control systems and how monitoring and control have helped to make the blended system an even more valuable asset.

Session 3: Workshop

• "Coating Inspection Forum," moderated by Peter Ault, Elzly Technology Corp.; and Chris Farschon, GPI; 3:00–5:00 p.m.

This annual forum provides an opportunity for attendees to participate in an interactive workshop where they can express their thoughts and perspectives on issues impacting coating inspectors. This year's topics will include issues relating to visual inspections, use of digital equipment and inspection planning.

Session 4: Corrosion

• "Corrosive Soils and Risk Management," by Paul Trautmann, The Sherwin-Williams Company; 3:00–3:30 p.m.

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This presentation will provide an understanding of corrosive soils conditions where corrosion control is warranted, identify the amount of steel loss when structural failure occurs, discuss models used to measure soil's corrosivity and corrosion rates, compare and contrast alternate corrosion prevention solutions, and identify generic coating types suitable for corrosive soils.

• "Quantification of Rustback and Flash Rust of Prepared Steel," by Anthony Monda, Elzly Technology Corporation; 3:30–4:00 p.m.

The presenter will outline methods of quantifying flash rust of waterjetted steel and rustback of abrasive-blasted steel and discuss research performed to determine if there is an allowable amount of corrosion that can be safely overcoated.

• "'The Weakest Link' — Crevice Corrosion of Critical Assets," by Rick Noles, Watson Coatings, Inc.; 4:00–4:30 p.m.

This presentation will cover transmission and distribution systems and how to minimize crevice-related corrosion. Topics will include the causes of crevice corrosion and how to prevent the process to begin with or remedy the situation once it has started.

• "Understanding the Environments," by Terry L. Gabbert, USAF Corrosion Prevention and Control Office; 4:30–5:00 p.m.

This presentation will look at the corrosion-control considerations that must be made before a piece of equipment or structure is built, including the different protective coating systems available for different substrates and how to determine and consider the different environments that the equipment or structure will encounter.

THURSDAY, FEB. 14

MORNING 8:30–10:30 A.M.

Session 1: Latin American Session, Part 1

• "Gestión de la Corrosión con Recubrimientos en Proyecto de Integridad," by Abel De La Cruz, Inforcorrosion; 8:30–9:00 a.m.

• "Corrosión del Concreto," by Guillermo Loayza, Productos Setmix; 9:00–9:30 a.m.

Session 2: Mini Session

• "Inspection and Touch-Up & Repair of Hot-Dip Galvanizing," by Amanda Swanberg, Valmont Coatings; 8:30–9:00 a.m.

The presenter will discuss the inspection process completed at galvanizing facilities prior to final shipment, including ASTM specifications and protocol for coating thickness, adherence testing and visual inspections.

• "Successful Detailing for Hot-Dip Galvanizing and Duplex," by Kevin Irving, AZZ Metal Coatings; 9:00–9:30 a.m.

This presentation will explain the basic yet critical design details necessary for a successful hot-dip galvanized project that are not taught in school. Several examples of proper design will be compared with the results of improper design.

Session 3: Mini Session

• "Superhydrophobic Versus Freezing Point Depression — Exploring Different Chemistry and Test Methodology of Ice Adhesion to

Coatings," by Andrew Recker, BASF; 8:30–9:30 a.m.

The presenter will explore the possibility of depressing the freezing point of water at the surface with various hydroxyl reactive additives providing for limited adhesion of the ice layer and how this approach compares to the superhydrophobic concept.

Session 4: Mini Session

• "Aluminum Corrosion & Corrosion Prevention in a Seacoast Atmospheric Environment," by Kenneth Tator, KTA-Tator, Inc.; 8:30–9:30 a.m.

There are many circumstances in which aluminum alloys are prone to corrosion and require treatment such as conversion coating and painting to prevent corrosion. The presenter will discuss aluminum corrosion, as well as the means to protect aluminum from corrosion, including anodizing and painting.

• "Optimized Aluminum Surface Preparation," by Damien Ranero, Naval Surface Warfare Center Philadelphia Division; 9:30–10:00 a.m.

Due to ongoing premature failures in the Fleet, the Navy's current methods for preparation of aluminum are being reevaluated. Information from this presentation will aid the draft of a new SSPC surface preparation standard for non-ferrous substrates that will be used by the Navy, Army, USMC, Coast Guard and other DoD services.

MID-MORNING 10:00 A.M.–12:00 P.M.

Session 1: Latin American Session, Part 2

"Waterjetting: Fundamentals and the Benefits of Environmentally Friendly Surface Preparation," by Juan Caballero, NIS SA, Panama; 10:00–11:00 a.m.

• "Certified Contractors for Mexico's New Airport: A Step Change Technology Approach," by Jose Valdes, Altamira & CIA S.C., Mexico 11:00 a.m.–12:00 p.m.

Session 2: Asia Pacific Session

• "The Mill Certificate for Polymeric Paints," by Melissa Chin Han Chan, Institute of Materials, Malaysia; 10:00–10:30 a.m.

A significant breakthrough to develop a method to provide a "mill certificate" for polymeric paints will be presented. This presentation will highlight the reproducibility and reliability of the techniques used and the final certificate which will allow users of polymeric paints an assurance of "what they buy is what they will get."

• "T&H GrapheneZn Technology," by Li Jin, SSPC China Chapter; 10:30–11:00 a.m.

The presenter will showcase GrapheneZn, a new technology based on graphene-reinforced zinc epoxy, which significantly improves anti-corrosion and provides wider application windows compared with traditional zinc epoxy technology in markets such as power plants, refineries, chemical plants, industrial and commercial facilities and more.

Session 3: EIS

• "Comparison of Field Impedance Measurements to Laboratory Data," by Bobbi Jo Merten, U.S. Bureau of Reclamation; 10:00–10:30 a.m.

Ongoing validation of field electrochemical impedance spectroscopy (EIS) testing has shown that the method can provide valuable information for evaluating coated structures. This presentation will evaluate EIS data obtained from coated structures in the field and laboratory coupons of the same coating products.

• "Identifying the Performance of Epoxy Mastic Coating with Non-Ideal Surface Preparation by EIS," by Md Ahsan Sabbir, Florida International University; 10:30 –11:00 a.m.

In this session, the presenter will analyze the application of EIS to capture coating degradation in aggressive environments. The presenter will identify repair coating durability with non-ideal surface preparation, as well as the degradation mechanism of repair coating in an aggressive environment.

• "EIS Study on the Behavior of High Performance Topcoats over Metal Substrates," by Donald Lawson III, AGC Chemical Americas, Inc.; 11:00–11:30 a.m.

The presenter will compare commercially available two-component topcoat systems, including the performance of FEVE, polyurethane and polysiloxane topcoat systems to provide additional corrosion protection for metal substrates.

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SSPC Coatings+ 2019: Exhibitors

More than 140 exhibitors from the protective and marine coatings industry will showcase their products and services in the Coatings+ 2019 exhibit hall. Exhibitor descriptions follow in the following pages; a list of companies with corresponding booth numbers can be found on p. 78. For more information on the Coatings+ exhibit hall, contact Nicole Lourette at lourette@sspc.org.

The Abrasive Blasting Manufacturers Alliance (ABMA). Toledo, Ohio; theabma.com. Booth 1218.

Abrasives Inc. manufactures Black Magic Coal Slag blast media and equipment for surface prep and coating professionals. Based in North Dakota, the company delivers to customers throughout the world. Glen Ullin, N.D.; abrasivesinc.com. Booth 1025.

Air Systems International manufactures confined space ventilation, Grade D and E breathing-air equipment, and environmental products. Chesapeake, Va.; airsystems.com. Booth 412.

Airtech designs and builds custom spray systems and other industrial spray equipment including industrial sprayers and spray booths for clients in the worldwide manufacturing, mechanical, transportation and other industrial sectors. Houston, Texas; airtechspray.com. Booth 201.

Alchemy Mineral. Dayton, Ky.; alchemymineral.com. Booth 1130.

APE Companies distributes surface preparation, safety and environmental management products for contractors in the Gulf Coast, Mid-Atlantic and Southeast markets. Companies include Abrasive Products & Equipment, Corrosion Specialties, BKW Environmental and Sharpjet. Pasadena, Texas; apecompanies.com. Booth 728.

APPI-Technology manufactures communication and security equipment for the most demanding environments to improve efficiency and safety. Nimes, France; appi-technology.com. Booth 110.

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Air Systems International manufactures confined space ventilation, Grade D and E breathing-air equipment, and environmental products. Chesapeake, Va.; airsystems.com. Booth 412.

Airtech designs and builds custom spray systems and other industrial spray equipment including industrial sprayers and spray booths for clients in the worldwide manufacturing, mechanical, transportation and other industrial sectors. Houston, Texas; airtechspray.com. Booth 201.

Alchemy Mineral. Dayton, Ky.; alchemymineral.com. Booth 1130.

APE Companies distributes surface preparation, safety and environmental management products for contractors in the Gulf Coast, Mid-Atlantic and Southeast markets. Companies include Abrasive Products & Equipment, Corrosion Specialties, BKW Environmental and Sharpjet. Pasadena, Texas; apecompanies.com. Booth 728.

APPI-Technology manufactures communication and security equipment for the most demanding environments to improve efficiency and safety. Nimes, France; appi-technology.com. Booth 110.

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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.; cdims.com. Booth 513.

ARMEX Blast Media is a line of baking soda-based abrasives from Church & Dwight, marketed by The ArmaKleen Company and sold through a worldwide distributor network for industrial service applications in either dry or wet blast systems. Princeton, N.J.; armex.com. Booth 409.

ARS Recycling Systems LLC manufactures abrasive blasting recycling systems, dust collectors, vacuum recovery units and rapid deployment equipment, including mobile (trailer-mounted) and skid-mounted units, with diesel or electric power. Lowellville, Ohio; arsrecycling.com. Booth 529.

Atlantic Design, Inc. is a full-service engineering and manufacturing business with over 30 years of experience selling and renting new and used equipment. ADI can also retrofit, upgrade and troubleshoot equipment you may already own. Abingdon, Md.; calladi.com. Booth 1133.

Atlas Copco Power Technique provides onsite products and solutions that power sustainable productivity for our customers. Product categories in our portfolio are air, power (including light) and flow. Rock Hill, S.C.; atlascopco.com. Booth 126.

Axxiom Manufacturing, Inc. manufactures the Schmidt brand of abrasive blast equipment and related components, now including the AmphiBlast wet/dry blast system. Fresno, Texas; 800-231-2085; schmidtabrasiveblasting.com. Booth 723.

Barton International supplies Mil-Spec and CARB-approved high-performance garnet abrasives for a wide variety of blasting applications to provide superior health and environmental safety and maximum performance. Glens Falls, N.Y.; barton.com. Booth 1007.

Bellemare Abrasives and Minerals offers a variety of high-performance abrasive products specialized to meet the ever-increasing demands of the blasting industry. Trois-Rivieres, Quebec; groupebellemare.com. Booth 323.

BlastOne International has been a consultant and supplier to the protective coating and corrosion control industry for over 40 years, providing strategic solutions to help clients become more competitive, efficient and profitable on blasting or painting jobs. Columbus, Ohio; blast-one.com. Booth 423.

Borchers Americas, Inc. manufactures the CHLOR*RID line of products for soluble salt detection and removal, including CHLOR*TESTs for measuring corrosive salts, CHLOR*RID Salt Remover and HOLD*BLAST for flash rust prevention. Westlake, Ohio; borchers.com. Booth 1014.

BrandSafway manufactures engineered suspended access systems for use with bridges, buildings, offshore platforms and special structures. The company sells and rents to contractors. Schenectady, N.Y.; brandsafway.com. Booth 200.

Bullard manufactures personal protective equipment, including hard hats, face shields, respirators, air quality equipment, rescue helmets and thermal imagers, with a focus on durability, comfort, safety, quality and innovation. Cynthiana, Ky.; bullard.com. Booth 107.

BYK-Gardner USA. Columbia, Md.; byk.com. Booth 115.

Carboline Company manufactures high-performance coatings, linings and fireproofing products in more than 20 manufacturing facilities around the world. St. Louis, Mo.; carboline.com. Booth 601.

CESCO supplies abrasive-blasting, paint-spray and safety equipment and manufactures the Aqua Miser ultra-high-pressure water blaster. The company provides product sales, rentals, service and used equipment. North Charleston, S.C.; blastandpaint.com. Booth 507.

Chemona USA. Voorschoten, Netherlands; nanocoatinternational.com. Booth 631.

The Chemours Company manufactures Starblast and AlZiBlast natural mineral abrasives for applications from waterjet cutting and monument etching to dry and vapor blasting surface preparation. Starke, Fla.; chemours.com. Booth 1212.

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.; clemcoindustries.com. Booth 901.

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***CoatingsPro* Magazine** features case studies written from the commercial and industrial coating applicator's perspective, as well as articles on business operation, new products, industry news and more. San Diego, Calif.; coatingspromag.com. Booth 329.

Cold Jet develops innovative, environmentally responsible dry ice cleaning solutions and dry ice production equipment, with international operations in Europe, Asia, Canada and Mexico. Loveland, Ohio; coldjet.com. Booth 219.

Cortec Corporation develops 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 corrosion inhibiting applications. St. Paul, Minn.; corteccoatings.com. Booth 400.

CSI Services, Inc. (CSI) is a third-party, SSPC-QP 5-certified consulting engineering firm that provides comprehensive coating inspection and consulting services including field and laboratory testing, maintenance and corrosion surveys, specifications, failure analysis and more. Santa Clarita, Calif.; csiservices.biz. Booth 415.

D.H. Charles Engineering, Inc. has been providing engineering, drafting and consulting services to the construction industry for over 20 years. Area of expertise include suspended platforms, bridge and building structural analysis, ventilation systems and more. Santa Rosa, Calif.; charlesengineering.com. Booth 925.

Dampney manufactures industrial and heat-resistant coatings for the petrochemical, power generation and OEM markets, including Thurmalox, a unique silicone resin technology that allows for ambient or hot applied applications in challenging environments. Everett, Mass.; dampney.com. Booth 1019.

Daubner Advanced Coating Solutions provides paint brushes and rollers, rigging supplies, and SharpWire to tie containment tarps. Wilmington, N.C.; daubnerusa.com. Booth 929.

DeFelsko manufactures coating inspection instruments, including the PosiTector series of interchangeable probes for measuring coating thickness, surface profile, environmental conditions, salt contamination, shore hardness and wall thickness. Additional products are available for pinhole detection, adhesion testing and more. Ogdensburg, N.Y.; defelsko.com. Booth 501.

Dehumidification Technologies, LP provides temporary humidity and temperature control solutions to multiple industries in the US, Canada, Australia and Thailand. Houston, Texas; rentdh.com. Booth 607.

The Department of Defense Corrosion Policy and Oversight Office is responsible for conducting the DoD's Corrosion Prevention and Control Program. Its major functions include developing and recommending policy guidance on corrosion prevention and control (CPC); coordinating CPC activities among the armed services; administering a science and technology program to advance the state of the art in CPC; ensuring that CPC is fully considered throughout the life cycle of military assets; providing guidance for improving corrosion maintenance and training; and serving as a resource for information on CPC methods and products. Washington, D.C.; corrdefense.org. Booth 1127.

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.; descomfg.com. Booth 618.

Detroit Tarpaulin, Inc. manufactures tarps, covers and custom enclosure materials used nationwide for containing lead from abatement projects, paint overspray and other construction projects. Romulus, Mich.; detroittarp.com. Booth 518.

DocoPro Ltd. Ringwood, Australia; docopro.com. Booth 1118.

Doosan Portable Power specializes in air compressors, generators, light towers and light compaction equipment. Statesville, N.C.; doosanportablepower.com. Booth 428.

DuPont Protection Systems provides a wide range of protective apparel solutions including the Tyvek, Tychem and ProShield brands to meet the safety needs of first responders to industrial workers alike. Richmond, Va.; personalprotection.dupont.com. Booth 1022.

Dustnet by EMI. Pensacola, Fla.; dustnet.com. Booth 419.

Eagle Industries supplies jobsite containment products including containment tarps and screens, scaffolding enclosures, reinforced poly sheeting, flame retardant tarps, shrink wrap, welding blankets and more. New Orleans, La.; eagleind.com. Booth 612.

Easy-Kleen Pressure Systems Ltd. has been a family-owned and -operated pressure washer manufacturer since 1982. Sussez Corner, NB; easykleen.com. Booth 1113.

Elcometer will showcase its line of inspection equipment and software for protective coatings and NDT inspection, including corrosion gauges, flaw detectors, adhesion testers, coating thickness gauges, surface profile gauges and climate/humidity gauges. Rochester Hills, Mich.; elcometer.com. Booth 701.

Element Materials Technology. Houston, Texas; element.com. Booth 1121.

EnTech Industries manufactures field-tested mobile and skid dust collectors, offered in diesel, electric and diesel/electric combination, and in capacities from 2,000 cfm through 60,000 cfm. East Grand Forks, Minn.; entechindustries.com. Booths 731 and EQ-7.

Ervin Industries manufactures highly engineered abrasives. Ann Arbor, Mich.; ervinindustries.com. Booth 931.

Fischer Technology, Inc. will showcase the latest instruments for nondestructive and

precise measurement of corrosion protection coatings. Windsor, Conn.; fischer-technology.com. Booth 215.

Forensic Analytical Consulting Services is an industrial hygiene consulting group that provides asbestos, lead and mold surveys; indoor air quality evaluations; occupational exposure monitoring; health/safety plans; litigation support; and other services to contractors, facility owners and others. Citrus Heights, Calif.; forensicanalytical.com. Booth 417.

Global Safety Management (GSM) is a SaaS-based compliance company that helps companies handle chemical and product safety information, making the workplace and the environment safer. Tampa, Fla.; gsmsds.com. Booth 1128.

GMA Garnet (USA) Corp. supplies garnets for the surface preparation industry. Material is available through its global distribution network and warehouses. Spring, Texas; garnetsales.com. Booth 307.

GMA Industries. Romulus, Mich.; gmaind.com. Booth 1026.

GNP Ceramics, LLC. Buffalo, N.Y.; gnpceramics.com. Booth 112.

Graco Inc. supplies technology and expertise for the coatings and vapor abrasive blasting in both industrial and commercial applications for customers worldwide. Minneapolis, Minn.; graco.com. Booth 401.

Green Diamond Performance Materials 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.; greendiamondsand.com. Booth 630.

Greener Blast Technology produces a surface preparation system that uses 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 in a number of applications. Tyngsboro, Mass.; greenerblast.com. Booth 108.

Greenman-Pedersen, Inc. (GPI) is an engineering consulting firm that specializes in the design and construction of transportation infrastructure and building projects. GPI's experts provide comprehensive engineering, design, planning and construction management services to a wide variety of government agencies, municipalities, institutions, industries, corporations and others. Wilmington, Mass.; gpinet.com. Booth 819.

Harsco Minerals processes mineral products for environmentally beneficial uses, including BLACK BEAUTY abrasives, roofing granules and aggregates products. Mechanicsburg, Pa.; blackbeautyabrasives.com. Booth 1001.

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Hempel manufactures high-performance coatings that are trusted around the world to protect valuable equipment and structures from corrosion. Conroe, Texas; hempel.us. Booth 121.

Herc Rentals Inc. is a full-service equipment rental firm providing customers the equipment, services and solutions they need to achieve optimal performance safely, efficiently and effectively. Bonita Springs, Fla.; hercrentals.com. Booth 402.

Hippo Coatings Company, a division of Hippo Multipower, produces spray rigs and combined compressed air/power solutions. The company distributes Graco and PMC equipment and offers sales and service for all products. Venice, Fla.; hippocoatings.com. Booth 231.

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.; hippwrap.com. Booth 724.

HoldTight Solutions Inc. manufactures surface preparation additives to assist with removing soluble salts and contaminants from blasted surfaces prior to coating and to prevent flash rusting, as well as testing equipment for measurement of surface conductivity and water quality. Houston, Texas; holdtight.com. Booth 900.

HRV Conformance Verification Associates, Inc. specializes in materials and coatings QA/QC inspection, and CM/CI for transportation, rail/transit, energy, power, commercial and water/wastewater markets worldwide. HRV provides certified inspectors for materials fabrication plants and project sites nationwide. Moon Township, Pa.; hrvinc.com. Booth 915.

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.; iviindustries.com. Booth 324.

InduMar has provided innovative solutions for pipe leaks, corrosion repair, and pipe rehabilitation for over 30 years, including a complete line of emergency leak repair kits. Houston, Texas; indumar.com. Booth 225.

Induron Protective Coatings. Birmingham, Ala.; induron.com. Booth 827.

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 through North America. Ixonia, Wisc.; industrialvacuum.com. Booth 928.

International Paint is a brand of AkzoNobel, a global paints and coatings company and a major producer of specialty chemicals. International and Devoe High Performance Coatings cater to the needs of oil and gas, power, infrastructure and various other industries. Houston, Texas; international-pc.com. Booth 1013.

IUPAT/FTI is committed to providing a workforce that gets the job done for you on-time and on-budget. Hanover, Md.; lmcionline.org. Booth 1107.

Jetstream of Houston/FS Solutions manufactures industrial high-pressure waterblasting equipment for a wide range of surface prep applications. Product offerings include a complete line of skid- and trailer-mounted units, pumps, control guns, valves, hoses, replacement parts and nozzles. Houston, Texas; fssolutionsgroup.com. Booth 1235.

Jiangsu LM Mining Co., Ltd. has manufactured three types of garnet for wet and dry blasting applications since 2007. Lianyungang City, China; lmgarnet.com. Booth 326.

JPCL celebrates its 35th year as the technical journal for the protective coatings industry and the voice of SSPC. Pittsburgh, Pa.; paintsquare.com/jpcl. Booth 807.

Jotun Paints Inc. Belle Chasse, La.; jotun.com. Booth 1115.

Kennametal, Inc. provides high-production abrasive blasting nozzle solutions for most every blasting need, including the XL Performance nozzle. Traverse City, Mich.; kennametal.com. Booth 313.

Kodin Testing Instrument Co. Ltd. Shanghai, China; kodin1718.com. Booth 1129.

Kordata provides mobile data collection software, including its Protective Coatings FastStart program that is based on SSPC industry standards and customizable for your company. Boise, Idaho; kordata.com. Booth 117.

KTA-Tator, Inc. was the first SSPC-QP 5-certified coating inspection firm. KTA employs over 140 NACE-certified inspectors and 60 CWI inspectors across the globe. In addition to coating inspection services, KTA offers coating assessments, laboratory testing, failure analysis, EH&S services, instrument sales, NDT, and training. Pittsburgh, Pa.; kta.com. Booth 525.

Langtry Blast Technologies Inc. Burlington, Ontario; blastech.org. Booth 823.

LiUNA. Hamilton, Ontario; liuna.org. Booth 1114.

MES Rentals & Supplies is a nationwide equipment rental house geared towards servicing the blasting and painting market. Its fleet contains dust collectors, vacuums, blast pots, steel grit equipment and more. Spanish Fort, Ala.; mesrentals.com. Booth 1028.

Mineral Tech, LLC. Highlands, Texas; mineraltechllc.com. Booth 1220.

Minerals Research Inc. manufactures SHARPSHOT slag abrasives and represents and distributes technical abrasives and equipment products, primarily in California and other western states. Tuscon, Ariz.; mineralsresearch.com. Booth 1102.

MONTI Tools is the North American office of the MONTI organization, presenting its patented BRISTLE BLASTER industrial surface preparation technology, a 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. Houston, Texas; monti-tools.com. Booth 207.

Montipower will showcase the MBX Bristle Blaster, a power tool surface preparation solution that removes corrosion, scale and coatings while imparting a 3-mil surface profile and near-white metal clean, ideally suited for spot repairs and jobs where abrasive blasting is prohibited. Manassas, Va.; mbxit.com. Booth 508.

NACE International serves more than 36,000 members in 130 countries, including engineers, inspectors, technicians, scientists, business owners, CEOs, researchers, educators, students and other corrosion professionals. Houston, Texas; nace.org. Booth 325.

The NACE International Institute was formed in 2012 to focus on certification and activities to advance the corrosion profession and has since expanded with the growing demands of the industry. Houston, Texas; naceinstitute.org. Booth 327.

National Equipment Corp. will display its Neco Blast Couplings and complete product line. Brenham, Texas; hosecoupling.com. Booth 726.

The National Center for Education and Research on Corrosion and Materials Performance (NCERCAMP) at the University of Akron provides solutions to corrosion and materials performance. Launched in 2010 with a grant from the DoD, the Center is focused on predicting, preventing and managing the nation's destructive corrosion and materials degradation problems. Akron Ohio; uakron.edu/ncercamp. Booth 627.

NexTec, Inc. / PreTox 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; pretox.com. Booth 211.

Novatek Corporation manufactures surface preparation equipment and portable air filtration systems for hazardous and non-hazardous environments, including a comprehensive range of needle scalers, peening prep tools, hand grinders, HEPA filtered vacuums. Phoenixville, Pa.; novatekco.com. Booth 922.

Nu Way Industrial Waste Management LLC is a waste broker specializing in hazardous and non-hazardous waste streams in the industrial and commercial sectors, including but not limited to: abrasive media/paint chips, used paints/thinners, dust collector filters, wash/decon water, and lead contaminated material. North Lima, Ohio; nuwayindustrialwm.com. Booth 515.

Olimag Sand produces non-toxic abrasives for sand blasting in eastern Canada. Its

synthetic olivine JETMAG is produced in a rotary kiln at 2,300 F. Thetford Mines, Quebec; olimag.com. Booth 729.

P&L Metalcrafts offers a full line of rigging supplies at wholesale pricing and specializes in designing and fabricating complete containment systems for any bridge or water tank. Its complete engineering staff qualified in every state. Youngstown, Ohio; metalcraftsyng.com. Booth 517.

Paul N. Gardner Co. Inc. produces physical testing and inspection instruments for the paint, coatings and related industries, including products that measure density, viscosity, coating thickness, adhesion, abrasion, color, gloss, hardness, washability and more. Pompano Beach, Fla.; gardco.com. Booth 628.

Pinnacle Central specializes in corrosion protection and industrial blasting, with a staff that offers a combined 125 years of practical experience in surface preparation equipment and media selection. Jacksonville, Fla.; pinnaclecentral.com. Booth 331.

Polygon established the use of desiccant dehumidification for both temporary climate solutions, document recovery service and emergency drying service applications over 60 years ago. North Andover, Mass.; polygongroup.com. Booth 1012.

Polyset is an MBE and ISO 9001-certified manufacturer of high performance coating systems for commercial and industrial markets, including the WB HRZS Single Coat System, a 100-percent waterborne, high-ratio zinc silicate. Mechanicsville, N.Y.; polyset.com. Booth 1125.

PPG Protective & Marine Coatings has decades of experience and a commitment to innovation, with a complete range of proven coating solutions to protect assets in the world's most challenging conditions. Pittsburgh, Pa.; ppgpmc.com. Booth 1101.

Rapid Prep rents and sells steel surface preparation equipment, 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. North Kingstown, R.I.; rapidprep.com. Booth 926.

RBW Enterprises, Inc. manufactures centrifugal shot blast cleaning equipment, specializing in portable systems that can be used both in plant and in the field. The company also manufactures special blast cleaning systems to meet industry needs for surface preparation of pipe, tanks, wind towers and steel plates. Newnan, Ga.; rbwe.com. Booth 314.

Ring Power. Riverview, Fla.; ringpower.com. Booth 829.

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. Standard or custom designed equipment for blasting, recovery, classification and dust collection to maximize flexibility and return on investment. Seattle, Wash.; safesys.com. Booth 512.

San-Blast-Ture produces The BLASTURE, the first patented confined space robotic arm for blasting and painting in hazardous confined spaces such as petroleum storage tanks, vessels and wind generators. The operator controls the robotic arm safely from outside the tank while watching a monitor with seven cameras. Saline, Mich.; h2otowers.com. Booth 127.

Sand Express supplies high-quality sand and coal slag blasting abrasives for contractors in the protective and marine coatings industry, including DAKOTA BLACK COAL SLAG. Columbus, Texas; sand-express.com. Booth 1018.

SciTeex Sp. Z.o.o. / Metallisation. Ul Spieyska, Poland. Booth 1207.

Shanghai Liangshi IntelRobot Tech. Corp. Shanghai, China; shlschina.com. Booth 1131.

Shanghai Xiang Rong Industrial Equipment Co. Ltd. manufactures sandblasting and shot-peening nozzles and solutions, including boron carbide (B4C), silicon carbide (SiC) and tungsten carbide (WC) nozzles. Shanghai, China; xr-ind.com. Booth 629.

The Sherwin-Williams Company is a protective coatings and linings manufacturer that has offered a complete line of products, market expertise and on-time distribution for nearly 150 years. Cleveland, Ohio; sherwin-williams.com/protective. Booth 813.

Sky Climber Access Solutions is a full-service suspended access supplier offering sales, rentals, service and training. Delaware, Ohio; skyclimberaccess.com. Booth 227.

Somay Q Technology (CBC America) produces next-generation anti-rust coatings, based on nanotechnology, that eliminate the need for sand blasting, decreasing waste and saving you time and money. Cary, N.C.; somayq.com. Booth 328.

Spider by BrandSafway has provided innovative suspended powered access solutions to the commercial painting and coating industry since 1947, including the iconic ST-17 work basket, industry-leading hoists and swing stages, netting solutions and more. Seattle, Wash.; spiderstaging.com. Booth 122.

Sponge-Jet, Inc. produces dry, recyclable, low dust and low rebound sponge media abrasives accelerate blasting and painting operations. Newington, N.H.; spongejet.com. Booth 913.

SSPC is a 501(c)3 non-profit organization focused on the protection and preservation of concrete, steel and other industrial and marine structures and surfaces through the use of high-performance protective, marine and industrial coatings. A number of SSPC's international chapters will have exhibit hall booths, including the **Brazil Chapter** (Booth I225), the **China Chapter** (Booth I230), the **Ecuador Chapter** (Booth I228), the **Hampton Roads Chapter** (Booth I224), the **Malaysia Chapter** (Booth I231), the **Panama Chapter** (Booth I229), the **Peru Chapter** (Booth I227), and the **Saudi Arabia Chapter** (Booth I226). Pittsburgh, Pa.; sspc.org. Booth 611.

Sulzer Mixpac USA, Inc. is a global manufacturer of innovative packaging, dispensing, mixing and spray systems for 2K adhesives, sealants, and coatings. Salem, N.H.; sulzer.com/mixcoat. Booth 523.

Surface Prep Supply. Haines City, Fla.; prepsupply.com. Booth I205.

T&H Chemicals Corporation Ltd. Booth II29.

Tank Industry Consultants Inc. is an engineering firm specializing in water storage tanks. Come by the booth to find out how including TIC on your team can transport you from tank maintenance nightmares to tank management solutions. Indianapolis, Ind.; tankindustry.com. Booth 706.

Tarps Manufacturing, Inc. produces custom containment tarps, building wraps and ground tarps in strong nylon and poly mesh. Many options are available in coated fabrics, FR, multi-layered tarps for sound reduction, and special printing. Meredosia, Ill.; tarpsmfg.com. Booth 923.

TECHNOFINK LLC provides solutions for high performance polymers, leak sealing and structural reinforcement in pipes as well as control and protection against corrosion. Spring, Texas; technofink.com. Booth 909.

Technology Publishing Company has published *JPCL* for 35 years. It provides its audience with a daily eNewsletter (*PaintSquare News*) and a digital edition. TPC also offers PaintBidTracker, the only project lead service dedicated to coatings work, and *PaintSquare Press*, a new print magazine for the industrial, commercial and architectural professionals. Pittsburgh, Pa.; technologypub.com. Booth 807.

Texan Stone LLC is a major wholesale supplier of India Beach garnet and Staurolite abrasives. all products are mined and sourced legally and available in all ports of USA, Canada, Mexico and other global destinations. Houston, Texas; texanstone.com. Booth III9.

Tinker & Rasor is an electronics firm engaged in the design, development and manufacture of holiday detectors, Detectron pipe and cable

locators and fluid leak detectors, plus a sizable line of cathodic protection instrumentation. San Bernardino, Calif.; tinker-rasor.com. Booth 924.

Titan Tool manufacturer 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, Minn.; titantool.com. Booth 214.

Tnemec Company Inc. offers products developed to protect against the most severe environments facing the water industry, supported by extensive performance data and technical service backed by a highly trained network of knowledgeable coating representatives. Kansas City, Mo.; tnemec.com. Booth 622.

TruAbrasives by Strategic Materials is the premier glass recycler on the continent. With a focus on operational excellence and process innovation, Strategic Materials abrasives were specifically designed to match performance of its competitors, while protecting workers and the environment. Houston, Texas; strategicmaterials.com. Booth 411.

TruQC is cloud-based quality control and process documentation software built for the iPad and web. TruQC makes truly objective project management possible, keeping all your relevant data organized and at your fingertips. St. Louis, Mo.; truqc.com. Booth 310.

U.S. Minerals is a slag product resource for the roofing and abrasives industries, producing Black Diamond brand abrasives. Tinley Park, Ill.; blackdiamondabrasives.com. Booth 301.

Ultimate Linings. Houston, Texas; ultimatelinings.com. Booth 1100.

Valentus Specialty Chemicals is a high-performance coatings company focused on superior technologies that can be applied in a broad range of applications where enhanced protection is critical, and with specific emphasis maintenance coatings. North Brunswick, N.J.; valentuschem.com. Booth 317.

Van Air Systems designs and manufactures products for the treatment of compressed air and gas. In the painting and coating industry, Van Air Systems offers portable compressed air systems for all jobs, big or small. Lake City, Pa.; vanairsystems.com. Booth 514.

Vector Technologies Ltd. has been building trailer- and skid-mounted industrial vacuum machines for over 40 years, including the new "Double Dump Continuous Vacuum" feature allowing users to be 33 percent more efficient on their jobs. Milwaukee, Wisc.; vector-vacuums.com. Booth 1027.

Versaflex / Raven Lining Systems. Broken Arrow, Okla.; versaflex.com, ravenlining.com. Booth 1124.

The Warehouse Rentals & Supplies offers quality abrasive blasting and painting equipment and related parts. Whether you need a respiratory helmet or a 60,000 Dust Collector, call on TWRS for your one source for it all. Greensburg, Pa.; twrs.com. Booth 828.

Watson Coatings Inc. St. Louis, Mo.; watsoncoatings.com. Booth 927.

Western Technology manufactures The BRICK, part of its "Kick It Tough" line featuring LED portable explosion proof, low voltage, wet location, LED Lights. Bremerton, Wash.; westerntechnologylights.com. Booth 917.

WIWA LP manufactures airless paint spraying equipment, including standard airless pumps, plural-component equipment and other industrial systems. Alger, Ohio; wiwalp.com. Booth 625.

Wuhan Twin Tigers Coatings Co. Ltd. Booth 1131.

Zibo TAA Metal Technology produces steel shot, steel grit, low carbon steel shot, bearing steel grit, sponge media and other shot/sand blasting products. Zibo Shandong, China; taa.net.cn. Booth 519.

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SSPC Coatings+ 2019: Daily Schedule

SUNDAY, FEB. 10

2:00 to 4:00 p.m.
Registration Open

12:00 to 5:00 p.m.
Phil Calvo Memorial Golf Tournament

MONDAY, FEB. 11

7:00 a.m. to 6:00 p.m.
Registration Open

8:00 to 11:00 a.m.
Poster Installation

8:00 a.m. to 5:00 p.m.
Exhibitor Move-In

8:30 to 10:30 a.m.
Concurrent Technical Sessions

11:30 a.m. to 1:00 p.m.
Awards Luncheon

1:30 to 4:30 p.m.
Concurrent Technical Sessions

2:30 to 3:30 p.m.
Annual Meeting

5:30 to 7:30 p.m.
Welcome Reception

TUESDAY, FEB. 12

7:00 a.m. to 7:00 p.m.
Registration Open

7:00 a.m. to 3:00 p.m.
Exhibitor Move-In

8:30 to 10:00 a.m.
Keynote Breakfast

10:30 a.m. to 12:30 p.m.
Concurrent Technical Sessions

1:30 to 4:30 p.m.
Concurrent Technical Sessions

5:00 p.m.
Exhibit Hall Ribbon Cutting

5:00 to 8:00 p.m.
Exhibit Hall Reception

WEDNESDAY, FEB. 13

7:00 a.m. to 5:00 p.m.
Registration Open

8:30 to 9:30 a.m.
Mini Sessions

10:00 a.m. to 12:00 p.m.
Concurrent Technical Sessions

11:00 a.m. to 4:00 p.m.
Exhibit Hall Open

11:30 a.m. to 1:00 p.m.
Complimentary Lunch in Exhibit Hall

3:00 to 5:00 p.m.
Concurrent Technical Sessions

THURSDAY, FEB. 14

7:00 a.m. to 2:00 p.m.
Registration Open

8:30 to 9:30 a.m.
Mini Sessions

10:00 a.m. to 12:00 p.m.
Concurrent Technical Sessions

10:00 a.m. to 3:00 p.m.
Exhibit Hall Open

11:30 a.m. to 1:00 p.m.
Complimentary Lunch in Exhibit Hall

3:00 p.m.
Poster Removal

3:00 p.m. to 8:00 p.m.
Exhibitor Move-Out

7:00 to 9:00 p.m.
Closing Blast

Getty Image / DESKCUBE

SSPC Coatings+ 2019: Committees

SSPC committees with active projects meet during the annual conference. The following committees are scheduled meet at Disney's Coronado Springs Resort during Coatings+ 2019. This schedule is current as of press time; the official committee schedule will be posted online at www.sspc2019.com and in the On-Site Guide. For more information about SSPC Committees, please contact Aimée Beggs at 877-281-7772, ext. 2223, or beggs@sspc.org.

SUNDAY, FEB. 10

8:30 to 11:00 a.m.
SSPC Standards Review Committee (Invitation Only)

1:30 to 3:30 p.m.
Surface Preparation Steering Committee (Invitation Only)

4:00 to 5:00 p.m.
Workspace Training/Chairs Workshop

MONDAY, FEB. 11

8:30 to 10:30 a.m.
C.1.1 Zinc-Rich Coatings
C.7.9 Coating Systems for Concrete

1:30 to 2:30 p.m.
Bridge Coating Advisory Committee

3:30 to 5:00 p.m.
C.2.3 Power Tool Cleaning
C.5.5 Platform Design
C.1.8 Fluoropolymer Coatings

TUESDAY, FEB. 12

10:30 a.m. to 12:00 p.m.
C.3.7 QP 5 Revision
C.7.3 Concrete Abrasive Blast Cleaning Standards

1:30 to 3:00 p.m.
SSPC/NACE JTG 323 Wet Abrasive Blast Cleaning Report

1:30 to 3:30 p.m.
C.3.5 QP 1 Revision
C.5.3.D QP 2 Revision

3:30 to 5:00 p.m.
C.5.6 Review PA Guide 10 and Tech Guide 17

WEDNESDAY, FEB. 13

8:30 to 10:00 a.m.
Joint SSPC/AWS/NACE TriSociety Task Group Revision of SSPC CS 23.00/AWS 2.23/NACE No. 6
C.1.3.D Polyurethane Coatings

10:00 a.m. to 12:00 p.m.
PCCP Advisory Committee Open Meeting

10:30 a.m. to 12:00 p.m.
C.3.16 Review of PA Guide 11 (Edge Protection)

12:00 to 1:30 p.m.
PCCP Advisory Committee Business Meeting

12:30 to 1:30 p.m.
Instructors Meeting

1:30 to 3:30 p.m.
Joint SSPC/AISC Task Group: SSPC-QP 3/AISC 420 Revision
C.8.2 Commercial Coating Materials

3:00 to 4:30 p.m.
Education Committee and Instructors Meeting

3:30 to 5:00 p.m.
C.2.20 Blast Cleaning of Non-Ferrous Substrates
C.1.14 Coatings for Wastewater Facilities

THURSDAY, FEB. 14

10:00 a.m. to 12:00 p.m.
TG 527, CPC Joint Task Group

96

The total number of presentations and workshops that comprise the technical program at SSPC Coatings+ 2019, held Feb. 11 to 14, 2019 in Orlando.
See page 51.

1,202 F

The high temperature at which a novel inert multi-polymeric matrix (IMM) coating continues to provide corrosion resistance without the need for post-cure or a zinc primer.
See page 24.

90%

The approximate percentage of coating thickness readings taken on structural steel and piping at a newly constructed gas compressor station that were below the specified cumulative thickness of 9 mils.
See page 11.

3 decades ago

The time when the use of modern industrial skilled rope access teams began operating in response to demand from offshore platform operators for the inspection, maintenance and repair of their assets.
See page 44.

March 2019

The date that change rooms and showers will be required for General Industry if exposures to beryllium are above the PEL or STEL or there is reasonable expectation of dermal contact.
See page 19.

The late 1800s

The age of an iconic building in Chicago, where on the 19th floor, two drinking water tanks (rumored to have once been boilers on paddle wheelers on the Mississippi River) awaited coating rehabilitation.
See page 39.