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The Voice of SSPC: The Society for Protective Coatings

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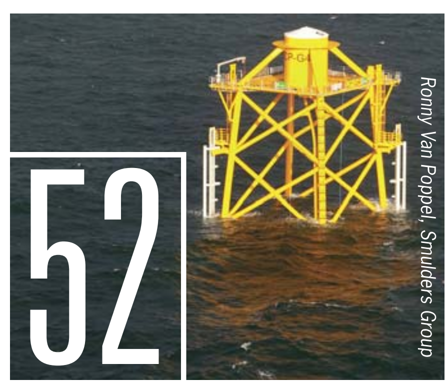
Features



Departments

Also This Month

From the Offices of SSPC

The Society For Protective Coatings

Staff

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Mentorship

Being a mentor is one of the most important things that we can do in our lives. A mentor is described as a wise and trusted counselor or teacher and an influential senior sponsor or supporter. This form of teaching or coaching could be to a co-worker, or just to an individual that we interact with on a frequent basis.

We are mentors to our children. We teach them to walk and talk, and how to take care of themselves, dress and act. We all want them to grow up to be productive members of society that we are proud of. Being a mentor to our children is the most important task we have in our lives. Why shouldn't we dedicate ourselves to having the same attitude with our subordinates considering the time we spend with them on a daily basis?

In my previous profession I had a successful career, not only because I worked hard and was dedicated to the organization and my subordinates, but because I had mentors along the way. Two of my closest mentors rose to positions of great responsibility and were outstanding leaders in both peacetime and combat. Both were Vietnam War veterans who lead small units in that conflict, and they later led large units during Operation Desert Storm. Both ended their military careers by commanding at Corps level units, which may consist of 20,000 or more personnel.

These individuals both took me under their wing and taught me how to be successful. They spent the time coaching me, teaching me and ensuring that I knew why they were doing what they were doing so that I could clearly learn from their experience. I learned the most by just watching them and seeing how they conducted themselves. They also had their dedicated "teaching moments." They mentored me and their other subordinates because they were both self-confident in their current positions and they knew that it would pay dividends to the organization in the long run. They knew they would eventually move on to a new assignment or ultimately retire, and they wanted to leave the unit where they were serving and, thus, the Army, in good hands.

At SSPC, we have started to do a much better job of trying to get students and young people involved in the organization and the entire industry. Our scholarship program has increased from four to six awards each year. We have given students a really great membership rate and we have streamlined our application process. We are doing what we can to get young people involved in coatings and make this industry their career of choice. Hopefully, when these young people join our profession, some of us will be their mentors and teach them the numerous aspects of the industry.

I know that I will not be around forever. I will eventually retire. When I leave SSPC, I owe it to the organization to leave it with the best staff possible. I try to have my "teaching moments" with individuals so they can understand why a particular decision was made, so that if they face the same situation in the future, it will be handled routinely. You, the readers, have to realize that you will not be around forever and you will eventually move on. Don't be an insecure person and think that if you teach a young person, they will immediately take your job. Take the time to be a teacher and a mentor to our young folks and your co-workers. Your organizations and our industry will be better for it.

Bill Shoup
Executive Director, SSPC

Two Free Webinars on DTM Coatings, Waterjetting Offered

The 2014 SSPC/*JPCL* Webinar Education Series resumes this month with two new, free online webinars.

"Overcoming Performance Challenges with Waterborne DTM Coatings" will be presented on Wednesday, August 20, from 11:00 a.m. to 12:00 noon, EST. Direct-to-metal (DTM) coatings provide advantages over multilayer systems by reducing the number of application steps, the raw material costs and the need for active pigments.

Waterborne resins used in anticorrosion coatings have improved dramatically in recent years, and new development is continuing to improve resin performance at reduced VOC levels. Because the corrosion protection provided by these coatings is highly dependent on both the resin and the formulation of the coating, choosing the appropriate solvents, additives and pigments is necessary. Attempting to drop-in or directly replace resins in waterborne formulations can result in substandard performance. Therefore, the formulation of these waterborne DTM coatings presents many challenges to the coatings formulator, which will be covered in this webinar.

Lori Boggs

Lori Boggs, a technical team leader with BASF, will present the webinar. Boggs has over 25 years of experience at BASF in automotive and industrial coatings. She holds a Ph.D. in chemical engineering from the University of Michigan, where she studied the mechanism of rheology control of coatings containing microgels.

This webinar is sponsored by BASF.

"Performance of Coatings over Waterjetted Surfaces" will be presented on Wednesday, September 3, from 11:00 a.m. to 12:00 noon, EST. This webinar will explore issues associated with waterjetting prior to application of protective coatings. The latest SSPC/NACE waterjetting standards will be described along with information about their use in project specifications. The webinar will conclude with a brief review of technical literature relating to the performance of coatings applied over waterjetted steel surfaces.

J. Peter Ault

Presenting this webinar will be J. Peter Ault, a principal of Elzly Technology Corporation. Ault has been actively involved in various aspects of corrosion control and protective coatings for over 20 years. His broad experience includes protection of highway, military, industrial and commercial infrastructure. Since 2006, he has been a principal of Elzly Technology Corporation. He holds Protective Coatings Specialist certifications from both NACE and SSPC and a Bachelor of Science degree in mechanical engineering and an MBA from Drexel University.

This webinar is sponsored by NLB Corp.

Registration, CEU Credits

These programs are part of the SSPC/*JPCL* Webinar Education Series, which provides continuing education for SSPC re-certifications and technology updates on important topics.

SSPC is an accredited training provider for the Florida Board of Professional Engineers (FBPE), and Professional Engineers in Florida may submit SSPC Webinar Continuing Education Units to the board. To do so, applicants must download the FBPE CEU form and pass the Webinar Exam, which costs $25.

Register for these online presentations at www.paintsquare.com/webinars.

Team TPC Joins Fight Against MS

Employees and friends of coatings industry publisher Technology Publishing Co. (TPC) joined the fight against multiple sclerosis, biking 150 miles to raise nearly $9,000.

TPC produces *JPCL*, *PaintSquare News*, *Durability + Design* magazine, *D+D News*, *JPCL Europe* and Paint BidTracker.

Team TPC participated in Bike MS: Keystone Country Ride 2014 over July 19 and 20. The bike ride, sponsored by the National MS Society, went from Hollidaysburg, Pa., to State College, Pa., and back.

The National Multiple Sclerosis Society aims to advance MS research and to reach out to, and advocate for, those affected by the disease. MS is an unpredictable, often disabling disease of the central nervous system that interrupts the flow of information within the brain, and between the brain and body. About 400,000 Americans and 2.3 million individuals worldwide have been diagnosed with the disease, according to national and international MS organizations. The U.S. estimate has more than tripled since the early 1980s, according to the National MS Society.

For its first year in the event, Team TPC was led by captains Andy Folmer and Tricia Chicka, who both rode in the event as individuals last year. The team's other riders included employees Michele Lackey, Josiah Lockley and Will Dodds, and friends Gina Fleitman, Ken Fisher and Tom Berna.

Bike MS is a personal cause for TPC; the team rode for coworkers who are living with MS.

As of July 22, Team TPC had raised $8,915 in donations for MS research and support programs. Online donations may be made through Aug. 22 on the team site, technologypub.com/bike or by scanning the QR code with your smart device.

Team TPC members pose after completing the 150-mile Bike MS: Keystone Country Ride 2014. Top row (L-R): Tom Berna, Tricia Chicka, Will Dodds and Andy Folmer. Bottom row (L-R): Josiah Lockley, TPC president Peter Mitchel and Michele Lackey.

SSPC to Hold Poster Session at SSPC 2015

SSPC has announced that it will be holding its first-ever Poster Session at SSPC 2015 featuring GreenCOAT in Las Vegas. The conference will take place from February 3–6, 2015, while the dates for the Poster Session will be February 4–6, 2015.

A Poster Session is a presentation of research information by an individual or representatives of research teams at a conference with an academic or professional focus. In the coatings industry, the work is usually presented by students or by young professionals.

Posters will be displayed in the Paradise Foyer at the Westgate Las Vegas Hotel, February 4–6, 2015, during the SSPC 2015 conference. In order to be considered for a poster presentation, interested parties should submit an abstract to Sara Badami at badami@sspc.org by September 30, 2014. First drafts for each poster are due by October 30. Drafts will then be reviewed by a selection committee for approval. Presenters will be notified of acceptance by November 15 and final drafts will be due by December 1.

All posters must include the following categories: Title; Abstract/Introduction; Objectives; Results/Discussion; Future Research; Conclusion; and References/Acknowledgements.

For details on submitting an abstract, please download the SSPC 2015 Poster Abstract Form. For session rules, please download the SSPC 2015 Poster Session Summary Form. These forms can both be found at sspc.org. Questions can be directed to Sara Badami at badami@sspc.org.

BUZZ on PaintSquare.com

HOT! This Month

A Dazzling Homage to Camouflage

The *Edmund Nelson*, a pilot ship owned by the Meseyside Maritime Museum in Liverpool, England, recently received the Dazzle Ship treatment, a brightly-colored and patterned camouflage coating system employed by the British Admiralty and the U.S. Navy during World Wars I and II (A Dazzling Homage To Camouflage, July 28).

Photo: Technology Publishing Co.

TRENDING NOW ON PAINTSQUARE NEWS

New Bridge Already Needs New Paint

PPG Swoops In On Comex

Ex-Worker Sees Racism in Paint Names

Smart Paint Signals Excessive Heat

PG&E Faces $1.1B Criminal Indictment

FROM THE PAINTSQUARE VIDEO LEARNING CENTER

- **How-To Steers Coatings Through Thick and Thin**
- **Coating Tips: Cleaning Your Concrete**
- **Cutting Into Coatings**

To access these educational videos, visit paintsquare .com/learning or scan the QR code with your smart device.

IN THE BLOGOSPHERE

Lead: Much Ado About Nothing?

In his July 28 blog, Warren Brand discussed some of the positive anti-corrosive characteristics of lead-based coatings and questioned the inclination of coatings industry professionals to immediately remove lead from structures. This prompted lively chatter in the comments section.

Robert Ikenberry: *In my experience, lead removal by owners is typically driven by one of two considerations, neither of which is necessarily technically sound. First is the anticipation of future cost savings. Looking at the costs of removal, containment, monitoring and disposal, owners have seen removal costs for lead steadily rise over the past 30 years. They believe (or are told) that abatement will just get more expensive, as regulations tighten and disposal costs go up, so they should bite the bullet now and remove it all. The second consideration is liability. Because the owner now knows there is lead on the structure, he or she will potentially be liable for all kinds of future problems. Often, the "prudent" course of action appears to be to remove the lead and the risk. Your blog shows it's not the only option, and often isn't necessarily the best one.*

Peter Gibson: *Lead is the same as the asbestos racket. Scare tactics to make money. It is lawyers driving the lead and asbestos racket. Lead and asbestos are perfectly good materials.*

David Horrocks: *Having been on both sides of the fence with this in terms of being an ex-blasting operator and having spent years managing this kind of work, I can see the plus side of leaving the lead intact but also the negative points of future maintenance issues. If I had to categorically choose to leave or not leave the lead in place? I would remove the lead and avoid future maintenance issues based on health- and safety-related risk factors. Now, that's not to say I wouldn't cost-evaluate the situation first. However, it works both ways for me. I would like to think my kids, who are in their twenties, will reach 30 or 40 years old and will not have to worry about blast cleaning lead off of old structures. The stuff as a product is amazing, and it has not been replaced, as some have commented here, yet it stinks when removing the stuff and is hazardous to health. It will take years to eradicate this.*

Get the coatings industry buzz at paintsquare.com, or scan the QR code for instant access!

On Coating a Stained Concrete Floor

I need to coat a bare concrete warehouse floor that has visible oil stains. What are my options for cleaning the concrete before coating it?

Warren Brand
Chicago Coatings Group
There are a few options I'm aware of. First, you can thoroughly clean the concrete to remove the oil. A variety of mechanisms are available, including use of trisodium phosphate (TSP), power washing with TSP, steam cleaning and scrubbing with TSP and/or other degreasers. The risk here is that even if you get the surface visually clean, will the oil eventually migrate back up out of the concrete, interfering with the bond? Second, you could physically chip away and remove the contaminated concrete. This is foolproof but very costly, and then you must make sure that the repairs adhere well to the remaining, existing concrete. Lastly, there are a number of companies that sell products that are designed to be oil-tolerant; that is, they are designed to go over these types of stains without the need for significant surface prep.

Timothy Knell
Shore Corporation
I would recommend a good alkaline degreaser that will clean off all surface dirt and oils and clear loose particles from the

pores. Then, use either an oil-eating bacteria-based product that will go into the cracks and eat the deeper oils as they rise up, or use a special, waterborne product that pushes oils to the surface in a hour or so. Depending on the job's timing, the specialized cleaners can be used first, like a laundry pre-spotter, so that when the surface degreaser is used, the deeper oils are already removed. Then you profile the surface, if necessary, based on the coating manufacturer's specifications.

Arun Gopinathan
Jotun Paints

First, perform alkaline degreaser/detergent cleaning with high-pressure water. If the oil stains are still visible, then there is oil penetration into the concrete. This needs to be addressed with hot air cleaning or flame cleaning to burn the oil off the surface. You will find concrete spalling on top, but this will ensure that the oil is removed to the maximum extent. While the concrete is still warm, proceed with a low-viscosity epoxy sealer to seal the pores of the concrete before proceeding with any repair.

Michael Quaranta
OPERATIONS 40

My advice begins with the word "depends." How old is the concrete and what caused the oil stains? Were they caused by a vehicle or by a piece of manufacturing equipment? This makes a difference in terms of the original viscosity. Rule number one: do not use any solvent-based or biodegradable cleaner before coating a concrete floor. They all leave a film deposit detrimental to the coating activity. Achieve a reasonable CSP-3 and notify the owner/client of the limited warranty for your services.

Jay Barstow
Aeroflor Coating Services

You're talking my specialty here (millions of square feet of concrete floor coatings over three decades). Warren is right — once removed, it will weep up again, but that can be dealt with. Problem is, you didn't give enough information for a proper answer. What type of coating — clear or pigmented? What type of surface prep? Everybody above made a valid point: alkaline degreaser, detergent, high-pressure steam cleaning, enzymes, flame and poultices. They all have their place, but most importantly: what, exactly, are you are trying to accomplish?

JPCL

SSPC PROTECTIVE COATINGS SPECIALIST

Q&A with Patrick Ricciardi

by Charles Lange, *JPCL*

Patrick Ricciardi is the vice president and co-owner of Pacific Titan, a painting and coating contracting company based in Riverside, California. With more than 25 years of experience in the industry, he is responsible for obtaining and bidding on projects, supervising employees, project management and overall field operations. In addition to his SSPC PCS certification, he is a NACE Level 3-certified Coating Inspector and a NACE-certified Corrosion Technician. He holds a Bachelor of Arts degree from Liberty University and a Bachelor of Applied Science degree from California State University-Northridge.

JPCL: How did you get your start in the protective coatings industry?

PR: I was a former college football player who needed to find a way to make money other than the NFL. My first experience working in the industry was on a temporary basis as a field painter with AA-1 Services in Paramount, California. At the time, it was simply a summer job that I had planned on being part-time until I decided what my ideal profession would be. However, when my wife got pregnant, patience gave way to pragmatism. AA-1was impressed with my work and was willing to offer me a full-time position, which was enough to support my family. Eventually, I came to know and love working in coatings, and I learned all the ins and outs of the business. From starting on the ground floor, I developed an uncanny knowledge and understanding of how to best manage projects and employees. I specifically enjoyed meeting a plethora of interesting people while working on a wide variety of challenging projects. Eventually, after a brief yet exhausting five years as a field painter, I was promoted to an estimator/project manager. I spent 10 years total with AA-1 Services before leaving to start Pacific Titan in 1998.

JPCL: Your company places a large emphasis on safety. Can you tell me about the importance of safety in the workplace, and how your company goes about making sure your workers are safe?

PR: Safety is the most important part of what we do, and that is not just a cliché. We want our clients to know that when we enter their facility, we have prepared for every possible outcome, and that our workers are not only concerned for their own safety, but the safety of anyone they may come in contact with. I believe that one should hope for the best outcome, but prepare for the worst. Therefore, I make sure that our employees are well-versed in not just avoiding problems, but also in preventing and solving problems. We have a motto: "The more we talk about safety, the less we talk about accidents." When you have been in this business as long as I have, you learn that the best thing that can happen to you is to know that each one of your employees has returned home healthy and happy to his or her family. That is why we currently employ two full-time safety managers to rigidly enforce our safety policies, and we invest approximately $200,000–300,000 a year in ongoing safety-related training.

JPCL: You are a certified underwater coatings inspector. How did you get into scuba diving — was it a hobby first, or did you start because it was part of your job? Do you still do underwater inspections personally?

PR: I don't personally do underwater inspections anymore, but we do have three certified divers working for Pacific Titan. It started out, as most things do, by circumstance. We were working on a project for an oil company in the Los Angeles Harbor, applying an epoxy to a damaged sea wall underwater. The oil company had no experienced divers to inspect the project, while we had three divers underwater performing coating repairs. Additionally, as a part of our own QC program, we started taking underwater photographs. Our most experienced diver was a NACE Level 3-certified Coating Inspector who subsequently wrote a report for the project. When I turned that report over to the owner, he was so impressed that he asked our company to do the inspection, and the rest is history.

JPCL: As co-owner of Pacific Titan, do you find it a challenge to balance running a company with doing your day-to-day coatings work? Do you prefer being in the office or being out in the field?
PR: It is a big challenge, but both areas are of equal importance. Because my move from holding a paintbrush to directing those who now hold them was gradual, I was able to slowly digest every important facet of the business. There is nothing that I do not enjoy doing at my job, but if I had to choose what I like best, it's to directly supervise the work. I enjoy being in the trenches. When I am in the field reviewing a project, I am tough on my workers, only because I want our customers to feel rewarded for choosing Pacific Titan.

Ricciardi (right) and an owner representative inspect a 48-inch-diameter crude oil pipeline at the Los Angeles Harbor. Ricciardi wrote the coating specification, and Pacific Titan coated portions of the pipeline.

JPCL: What's the most important lesson that you've learned throughout your career?
PR: No question, being flexible. One thing I have learned is that when you think you have it all figured out, you have set yourself up for failure. You either adapt or die, and I choose to adapt to the new trends and government ramifications in this industry. That is why I am always listening to new ideas, attending trade conferences, picking up new certifications and studying new scholarly articles and trade journals for our industry. I am always willing to give speeches to people like myself who are looking to learn more about the coatings business, but I prefer to listen, learn, adapt and move forward. I have told my staff, "If I ever reach the day I think I know everything, that is the day I should retire".

JPCL: What's your favorite sector or industry setting to work in? For example, do you like diving in a tank, or climbing a high-rise structure or something else?
PR: I prefer the petrochemical sector. I enjoy the challenge of installing a coating that can protect in the most difficult service environments, as well as researching the theory of coatings — specifically complex resins. I see myself as an out-of-the-box thinker, and when a customer asks me for my advice, I'm going to do my best to choose the most qualified product available. We get most of our business through referrals, and picking a cost-effective product that lasts longer than the lifetime of the average human ensures our company's reputation in the industry.

JPCL: What has been the highlight or proudest moment of your career thus far?
PR: About 15 years ago, I hired a worker who had just gotten out of prison. Although my partners at the time tried to dissuade me from hiring this individual, I did my due diligence and found the man to have a multitude of desirable characteristics: reformed, physically fit, mentally cognitive and hungry. The only negative characteristic was the undesirability by competitors who saw this individual as "damaged goods." I knew in my heart that the only thing that this man needed was an opportunity, and I turned out to be right. I have never come across a worker who was more willing to immerse himself so thoroughly in the coating trade, and today this individual is one of our very best foremen.

One day he walked up to me out of the blue and thanked me for believing in him. He said, "Thank you, Pat, for teaching me a trade and changing my life." I was very honored by his appreciation, and that was my proudest moment since becoming involved in the coating industry. It dawned on me at that time that I had not only changed his financial livelihood, but I had forever changed his life.

JPCL: How do you like to spend your free time? What are some of your hobbies outside of work?
PR: The joy of my life is my Christian faith and family. I have a great wife, four beautiful children and one awesome grandson. I spend much of my free time as director of life groups at my Baptist church. I am an avid runner, running four or five times a week for the past 20 years. You can always catch me at my work, at home, at church or running on the streets of Hemet, California.

Setting Up Air Abrasive Blast Equipment

Fig. 1: Blast pot
Courtesy of Axxiom Manufacturing

An air abrasive blast equipment system is composed of several major components, including the following.

- Air Compressor
- Blast Pot (Pressure Blast Tank)
- Abrasive (Blast Media)
- Blast Nozzle
- Moisture Trap
- Deadman Switch
- Blast Hood
- Interconnect Hoses

Let's take a look at each to see how they work together to provide an efficient abrasive blast system.

Air Compressor

The air compressor provides high-pressure air for the blasting operation. This machine takes in atmospheric air at 14.7 psi and compresses it to a pressure several times higher, usually about 120 psi. The heat generated through compression is somewhat dissipated by an air intercooler. The air then passes through moisture and oil separators to make it dry and oil-free as it exits the compressor.

Air compressors are generally identified by output capacity, such as 250 CFM, 325 CFM or 750 CFM. CFM means cubic feet per minute, which is how the volume of pressurized air is measured. The power to run a compressor is usually provided by an internal combustion engine (gasoline or diesel) or by an electric motor. Selection of a power unit is generally dictated by the area where blasting is to be done or by the availability of utilities.

Editor's Note: This Applicator Training Bulletin is an update of a previous article written by Joe Fishback of Custom Blast Services Inc. It was first published in the November 1989 JPCL *and has been updated for this issue by Bill Corbett and Stan Liang of KTA-Tator, Inc.*

Fig. 2: Multi-colored deadman switches. Courtesy of SAFE Systems, Inc.

Before starting the compressor, remember to:

- check the engine oil level;
- check the coolant level; and
- check the belts and hoses for leaks or defects.

Blast Pot

The blast pot (Fig. 1, p. 17) is a coded pressure vessel generally referred to as a pressure blast tank (PBT). Because it is a pressure vessel, it must have a stamp on it showing that it has been pressure tested. The PBT is further identified by size. For example, it may be called a 6-ton PBT or a 6-sack pot (based on silica sand), referring to the amount of abrasive it can hold. During operation, the blast pot is pressurized and feeds abrasive into the air stream.

Abrasive (Blast Media)

While not usually thought of as abrasive blast equipment, not much happens to the surface without the abrasive. Abrasives are generally categorized as expendable (one-time use) or recyclable (multiple uses). The type, size, shape and hardness of the abrasive all affect productivity as well as the depth and shape of the surface profile or anchor pattern. The cleanliness of the abrasive is just as important as the cleanliness of the compressed air used to propel the abrasive. A vial test is performed on new or recycled abrasive prior to use. The abrasive is tested for oil according to ASTM D7393 and conductivity according to ASTM D4940. According to the SSPC standards, abrasives cannot contain any visible oil and cannot have a conductivity that exceeds 1,000 μS.

Blast Nozzle

The blast nozzle is a small but important piece of the blasting equipment. It is the last item to exert influence on the blast media. Nozzles are identified by their shell composition, their lining composition, the size of the orifice and length (for example, aluminum shell with tungsten lining, size #7, short). The orifice size number relates to the size in 1/16-inch units (#7 = 7/16-inch). The size of the nozzle has a bearing on the amount of air and abrasive used and on the amount of work completed. The larger the size of the nozzle, the greater the consumption of supplies. Nozzles are chosen for the work to be performed.

Moisture Trap

The moisture trap is a device that allows the compressed air to shed water. As the air is compressed, heat is generated. As this hot air passes through the heat exchanger to lower the air temperature, water in suspension (humidity) is condensed. Generally, a compressor is fitted with a moisture trap. This first trap catches most of the water. However, as the compressed air continues to cool, additional moisture condenses in the bull hose. This remaining moisture is trapped by the moisture separator just before it enters the PBT. This trapping is done either with a centrifuge-style separator or with a replaceable filter element-style separator. Generally, it is necessary to leave an air bleed valve open in the bottom of the moisture trap when blasting to allow the moisture to be expelled.

Deadman Switch

The deadman switch (Fig. 2), either pneumatic or electrical, allows the blaster to have remote control over the pressurization of the blast hose. With pneumatic operation, this is accomplished when pressure through the deadman switch closes the air control valve and opens an escape valve. This prevents air from entering the PBT and at the same time, it depressurizes the PBT. Electrically operated systems use pinch valves to stop the flow in the blast hose. With electrically controlled systems, the PBT is always pressurized when the bull hose is connected and pressurized.

The primary purpose of the deadman switch is safety. It provides a means to stop

Fig 3: Blast hood
Courtesy of Bullard

the discharge of abrasive from the nozzle when a safety hazard arises. The fact that it allows the blaster to start and stop work at his discretion is a secondary purpose.

Blast Hood

The blast hood (Fig. 3) is a piece of safety gear that provides a degree of comfort to the blaster as well. This hood is generally a reinforced plastic shell with a replaceable skirt that covers the torso of the blaster. It has a double-faced shield of clear plastic for eye protection and an air feed line to provide positive pressure under the hood. The positive air pressure under the hood prevents the entrance of harmful blasting dust and abrasive. Air coolers are also available. If the air is coming from a diesel compressor, an air purifier and carbon monoxide monitor are required.

Hoses

Hoses vary in size depending on the work to be performed, available air capacity, distance to work area and other considerations.

The first in the sequence is the bull hose. This is generally a short hose — less than 50 feet long, with an internal diameter (ID) of approximately 2.5 inches or less that provides passage of air from the compressor to the PBT.

The next hose is an air-line with an approximate ID of 0.75 inches or less that provides air first to a moisture trap and then to the blast hood. The section between the moisture trap and the hood is smaller, down to 0.25-inch ID.

Control hoses can be down to 0.20-inch ID and are generally duplex (dual-line) hoses. They run from the control valve on the PBT to the deadman switch and back to complete the circuit when the blaster is ready to commence work. Included here is the electrical wiring necessary if the deadman is electrically operated. It generally operates from a 12-volt DC source such as the compressor power unit's DC system.

The last hose in the circuit is the blast hose. It is a thick-wall, wire-reinforced hose designed and constructed to contain the high-pressure air (up to 120 psi) and abrasive mixture that moves from the PBT to the blast nozzle. The blast hose is constructed in three layers: an inner wearing lining, a conductive layer and an outer wrapping. Abrasive passing through a blast hose builds up static electricity. The conductive layer is needed so the whole system can be grounded. As a general rule, the hose should be three times the ID of the nozzle orifice; ideally, 1.25 inches to 1.5 inches for optimum production.

Setting Up the System

With the major sub-assemblies identified, we can now set up our blasting equipment. Position the compressor upwind from the work area so that airborne grit does not enter the cooling or air intake systems. The compressor should be level so that the oil and moisture separators can function efficiently. The power unit's lubrication system also depends on the compressor being level. After fluid levels (oil, coolant and fuel) have been verified and topped off, the compressor is ready to start.

The bull hose should be laid out with no kinks and a minimum of bends. Prior to making connections at the compressor and PBT, the sealing gaskets should be examined for tears, cracks or other sealing problems. As soon as the connectors have interlocked, a safety pin or wire should be inserted to prevent accidental separation of the joint. If this separation should occur, there is great potential for personnel or property damage as the hose whips around. The hose should be examined for damaged locking lugs, missing gaskets, soft spots, torn covers or other damage.

If any defects are observed, consideration should be given to replacement of the worn or damaged part. If all appears in good condition, make the connections at the compressor and PBT moisture trap.

The next step is to lay out the blast hose utilizing the same inspection procedures used for the bull hose and fittings. If all is in good shape, connect the selected nozzle and pin all fittings.

When the blast hose connection is complete, you can run the hose for the deadman switch. The fittings on the ends of this hose are brass, male/female and threaded. It is necessary to use the proper-sized wrench to prevent damage to the brass hex surfaces. As the hose is installed, care should be taken to lay the hose parallel to the blast hose. The control line should also be secured to the blast hose by tape or other means to minimize possible damage to this less durable hose. This is important because air leaks in the control line will not allow the control valve to pressurize the PBT and thus no blasting takes place. The threaded fittings should be tightened securely but not over tightened.

Now, go back to the air source for connection of an air-line to feed the small moisture trap for hood atmosphere. These fittings are usually 0.75-inch crow's foot, quick-disconnect fittings. Inspection of hose gaskets and locking lugs is once again necessary. Be certain to pin all quick-disconnect crow's feet.

The hood atmosphere line is the last hose to be hooked up. This hose has brass screwed fittings similar to those on the control line. The same care in hook-up should be exercised, with particular attention to preventing entry of debris.

Now, with all hoses connected to their respective fittings, you are ready for pressurized air. Close all air outlet valves on the compressor. Press the shutdown bypass button as well as the start button. The compressor should start and run. After the temperature moves up to the operating temperature, it is time to press the service air switch. At this time the air pressure gauge should register approximately 110–120 psi. If the reading is higher or lower, adjustments should be made before beginning the blasting operation. When the compressor stabilizes at working air pressure, slowly open the valve to furnish hood atmosphere air. After the quality (oil and contaminant-free) and quantity of this air are verified, slowly open the valve for the bull hose. There should be no air escape except at the moisture trap bleeds. If air leaks are present, they should be repaired. The PBT can now be filled with abrasive.

The blaster should be clothed with sturdy shoes or boots, heavy pants, a long-sleeved heavy shirt and leather gloves for protection from bounce-back of abrasive. When the blaster has been properly suited up, he or she can check operation of the blast equipment. He or she does this by opening the deadman valve to pressurize the PBT and thus force a quantity of abrasive to enter the air stream to the blast hose.

Adjustments in the amount of abrasive delivered to the nozzle can be made with an abrasive valve located close to the bottom of the PBT. Enough abrasive to do the work should be delivered, but not so much as to slow the impact or choke the blast hose or nozzle.

To assure the quality of cleaning, two important checks should be made. The first is a compressed air cleanliness test, also known as a white rag or blotter test. This test determines if the blast air is free of moisture and oil as it is delivered to the nozzle. The abrasive valve is closed to prevent abrasive from entering the air stream. A white rag or blotter (called an "absorbent collector") fastened to a rigid backing is then positioned in the air stream within 24 inches of the nozzle. A non-absorbent collector such as rigid transparent plastic may also be used. After a minimum of one minute, the collector is removed and examined for oil or moisture contamination. If evidence of oil is present on the collector, adjustments must be made to the system, possibly by service personnel from the supplier of the compressor.

The second test measures nozzle pressure. This measurement is taken with a needle pressure gauge. The needle is inserted into the blast hose in the direction of air and abrasive flow. This insertion takes place close to the nozzle with both the air and the abrasive flowing. Nozzle pressure is read directly on the face of the gauge. Optimum blast nozzle pressure should be approximately 100 psi for productive work. Pressures lower or higher than 100 psi may improve productivity depending on the abrasive being used.

With proper setup of equipment and a thorough knowledge of good safety practices, your job should be safe and trouble-free.

The Case of...Improperly Cleaned Surfaces: Failures in Preparation or Specification?

By Jayson L. Helsel, P.E., KTA-Tator, Inc.
Rich Burgess, PCS, KTA-Tator, Inc., Series Editor

What happens if coatings are applied to an improperly cleaned surface? The simple answer might be to expect premature failure, but what exactly is an "improperly cleaned" surface? Was a contaminant left on the surface? Was cleaning not otherwise sufficient to meet the specified standard? Or was the specified coating not appropriate for the level of cleaning?

For example, if the specified surface preparation for a steel surface is "Power Tool Cleaning" (SSPC-SP 3) and a zinc-rich primer is applied and poorly adheres, was the surface improperly cleaned? Most would recognize that the referenced power tool cleaning standard is not sufficient preparation for a zinc-rich primer, as these primers require removal of all existing coatings, corrosion and mill scale and a roughened surface.

Fig. 1: Widespread rusting over a swimming pool bottom due to high surface profile and/or low coating thickness. Photos courtesy of KTA-Tator, Inc.

Proper surface preparation is always one of the most critical steps in a successful coatings application. The purpose of surface preparation is generally twofold: to clean and to roughen the substrate according to the specified requirements. The method or methods used to prepare surfaces for coating application may clean and roughen simultaneously — as with abrasive blast cleaning.

With few exceptions, the surface preparation should reference recognized industry standards such as those published by SSPC. All of the SSPC standards related to preparation of metallic substrates incorporate SSPC-SP 1, "Solvent Cleaning," which is intended to clean the surface before further preparation to remove rust, paint and other materials. When cleaning allows surface contamination to remain, a problem is created. If any "interference" material is left on a surface, the coating may not properly contact and adhere to the substrate. Oil, grease, dirt and chalking are obvious interference materials. Less obvious contaminants may not even be visible, such as soluble salt contamination (e.g., chloride).

Coatings may actually attain good adhesion if a relatively low level of salt contamination is present. But when enough moisture eventually permeates the coating and solubilizes the salt, water molecules begin to collect around the salt. Free water and moisture in sufficient quantities will form a gradient causing additional water to collect and thereby cause coating to lose adhesion in the form of blistering or delamination. The salt solution, an excellent electrolyte, will also accelerate the corrosion of metal substrates.

Once a surface is cleaned of contaminants, various methods to prepare surfaces to the specified level of cleanliness are used. Surface preparation methods include hand and power tool cleaning, abrasive blast cleaning and waterjetting. The degree of cleaning required by a given project specification is dependent on the service environment (the environment that the coating system must perform in), the coating system and the intended service life of the coating system once installed.

In making selections for surface preparation and coatings, it is critical that these items are properly matched. When this is not the case, a coating may not achieve the degree of adhesion needed to perform as intended. When it comes to surface preparation, this "failure to perform" might be considered a premature failure. But in reality, accelerated degradation of the coatings could have been expected.

Generally, better surface preparation

equals better performance. Although blast cleaning may not be required for alkyd coatings, they will have a longer service life when applied over a blast-cleaned surface as compared to a power tool-cleaned surface (e.g., SSPC-SP 3). A review of manufacturers' product data sheets (PDS) demonstrates that although a coating might be suitable for one surface preparation method, the use of a second, more advanced degree of surface cleaning will provide better performance. Consider the implications of specification language that simply says to prepare surfaces in accordance with the manufacturer's recommendation, particularly when applying "surface tolerant" coating. Would it be unreasonable to argue that the failure was not premature – the surface was properly cleaned, but the expectations were too great?

A short review of some examples serves to bring this topic into focus.

Fig. 2: Closer view of pinpoint rusting on pool bottom; more concentrated areas of rust typically had a higher surface profile.

Service or Storage?

In one case where a failure occurred, alkyd coatings had been applied to structural steel in the fabrication shop. The specified surface preparation was "Hand Tool Cleaning" (SSPC-SP 2) and "Power Tool Cleaning" (SSPC-SP 3). After the steel was delivered to the job site and construction had begun, the coating began to delaminate from the steel. Investigation of the problem found loose mill scale on the surface of the steel – and mill scale on the back of the failing coating. The conclusion was that the surface had not been properly prepared, because that level of power tool cleaning required removal of all loose material including mill scale. The steel surfaces were adequately cleaned for the service environment they were being placed in, but unfortunately not for the environment in which they were stored during construction.

Fitting the Profile

In another instance, following completion of a bridge painting project, relatively small areas of damaged coating were prepared by "Power Tool Cleaning to Bare Metal" (SSPC-SP 11) and the organic zinc-epoxy-urethane system was reapplied. But after just a few weeks, failures in repair areas were observed and testing found poor adhesion of the zinc primer to the steel. The surface appeared to have been cleaned to bare metal, but little to no profile had been created, which likely caused the poor adhesion. The specified standard, SSPC-SP 11, required a minimum profile of 1 mil. The surface preparation standard was achieved, but the applied coating system required a 2–3 mil anchor profile.

Consider the blast cleaning standards for a moment, which include “Commercial Blast Cleaning” (SSPC-SP 6/NACE No. 3), “Near White Metal Blast Cleaning” (SSPC-SP 10/NACE No. 2) and “White Metal Blast Cleaning” (SSPC-SP 5/NACE No. 1). During inspection, they are differentiated only by the amount of “staining” allowed to remain on the surface. When any of these three cleanliness standards is specified, yet the applied coating system delaminates or exhibits pinpoint rusting, can it be simply argued that the degree of cleanliness was not achieved? The answer is no. The blast cleaning standards identify the criteria for surface cleanliness of the steel but do not specify a surface profile. The project specification should include an appropriate range for an angular surface profile. Too little of a profile may not provide sufficient anchor for higher build systems or for other coating options such as metallizing. Too great of a profile, however, may also lead to problems, which was the case when a steel swimming pool was recoated.

Swimming in Failure

The in-ground, steel swimming pool was abrasive blast cleaned and painted in the spring. There was not a coating specification for the work, but the surface preparation and system application were to be completed in accordance with the coating manufacturer’s PDS requirements. The system applied consisted of two coats of epoxy coating at a DFT of 4 to 8 mils per coat. Shortly after the completion of painting during the summer, the coating began delaminating and rust was evident on the underlying surfaces. The delamination was reported to have occurred primarily between the two epoxy coats. During the fall, the painting contractor repaired the delaminating and rusted areas, and applied a full overcoat. Over the ensuing winter, with the pool partially filled and out of service, delamination and rusting continued. The contractor again made spot repairs (not a full overcoat) the following spring but failure continued to occur.

An eventual investigation found that the pool had significant areas of rusting on the side walls, ledges and bottom (Fig. 1, p. 25). Rusting consisted of spot and pinpoint rusting and was estimated to cover up to 20 percent of the pool's surface area. At some of the rusted areas, rust staining had spread to adjacent areas, giving the appearance of an even greater degree of rusting. The most recently applied repair topcoat (from the previous fall) was delaminating from the underlying original coatings on over 30 percent of the pool surfaces, including the ledges, walls and bottom. At areas where the repair coat was still attached, it could typically be easily removed. There were also some areas where small blisters were present but no rusting was apparent. When these areas were scraped with a putty knife, rusting was found underneath. Random adhesion testing found that the repair coat had uniformly poor adhesion (tape test rated as 0A) to the underlying original coatings. The adhesion of the original coating layers was also tested at areas where the repair coat had delaminated. The coating adhesion was typically fair (rated as 2A to 3A) in these areas. The dry film thickness of the existing coatings varied widely and ranged from approximately 3 to 18 mils at areas where all coats appeared to be present. Areas where the repair coat had delaminated were lower in comparison ranging from 2 to 7 mils in total thickness.

Because the appearance of pinpoint rusting (Fig. 2, p. 27) suggested high profile might have been an issue, the coatings were removed using a chemical stripper in selected areas. These areas were primarily where the complete coating system was intact (including the most recent topcoat) and no rusting was present. As the coating layers were progressively removed, rusting of the underlying steel was apparent at some locations. Profile measurement on the bare substrate found that the surface profile was consistently higher than the 2 mils specified by the coating product data sheets. When all coating layers were removed, the profile was measured and found to range from 2.4 to 4.2 mils. Also, the coating thickness varied significantly and was frequently below the specified thickness published in the coating product data sheets of 8 to 16 mils for two coats. An even greater thickness should have been expected due to the coating repairs that were completed subsequent to the original work. The combination of a high surface profile, typically 3 to 4 mils, and the application of coatings below the specified thickness led to the pinpoint rusting observed on the pool surfaces. The rusting likely began after the first initial coat was applied, which would have created adhesion problems for the second coat.

Conclusion

These coating failure examples show the importance of specifying the appropriate surface preparation – and profile if required. The failure does not implicate a failure to achieve the appropriate degree of surface cleanliness. Rather, there was improper roughness and coating system thickness.

Achieving a properly cleaned surface is no guarantee of success. Properly cleaned is not the same as adequately cleaned. It is important to properly match the coating system (the level of surface preparation, coating types and coats), roughness and expectations to the service environment and likely service life of the coatings. To do otherwise invites failure – whether due to the coatings actually failing or parties failing to understand what should have been expected.

About the Author

Jayson Helsel, P.E., PCS, a senior coatings consultant with KTA-Tator, Inc., manages failure investigations and coatings projects and is involved with coatings surveys and inspection of industrial structures. He holds a Master of Science degree in chemical engineering from the University of Michigan, is a registered professional engineer and is a NACE-certified Coatings Inspector. He has been published in the past in *JPCL, Durability + Design* and in the *Journal of Architectural Coatings*, which featured his monthly column, "Getting It Right."

IMPROVING POLYURETHANE PIPE COATINGS FOR HARSH CONDITIONS

By Andreas aus der Wieschen, Matthias Wintermantel, Todd Williams and Ahren Olson
Bayer MaterialScience AG

Liquid polyurethane (PU) coating systems are of growing importance in the field of external coatings for oil and gas pipelines. Coating systems based on aromatic polyisocyanates and pre-polymers are used for new pipeline construction and for maintenance work.

Major drivers for the use of polyurethane coatings in pipe applications are their favorable cure characteristics combined with superior mechanical properties especially under harsh conditions. Solvent-free, two-component polyurethane systems have been approved as suitable protective coatings systems within the pipeline industry and have been used for new tubes (steel and ductile iron) and for field joints.

Furthermore polyurethanes are of growing importance for the renovation of oil and gas pipelines in the field due to their ability to cure at low temperatures and their exceptional mechanical properties.

Application Properties

Solvent-free two-component PU coatings have the ability to create an inherent thickener effect during application. This effect avoids sagging on vertical surfaces and allows the formation of high film thicknesses applied in one coating layer. Therefore PU systems can fulfill the postulated requirements with dry film thicknesses of about a minimum of 500 µm up to 5,000 µm and higher.

Curing Time and Reactivity

Standard polyurethane systems are touch-dry after approximately 60 minutes at 20 C or approximately 100 minutes at 5 C. The time for through drying can vary from approximately 50 minutes to approximately four hours at 20 C. The reactivity of a polyurethane system can be controlled by incorporating suitable catalysts.

Figure 1 (p. 34) shows the potential versatility of PU coatings, adjusting reactivity by means of four different formulations. With formulation Nos. 2 and 3, approximately 90 percent of the end hardness – depicted as Shore D – has been reached after roughly four hours which makes these coatings generally suitable for field application. Furthermore two formulations (Nos. 1 and 4) provide Shore hardness of D50 and D60 after only five minutes which would make those combinations generally suitable for plant application.

MECHANICAL PROPERTIES

Most relevant technical parameters for oil and gas pipeline coatings are related to mechanical properties such as film hardness and flexibility along with adhesion, and resistance to chemicals and solvents. Liquid polyurethane pipe coatings typically provide increased impact resistance at higher Shore hardness than standard pipe-coating epoxy systems. High-impact resistance is beneficial because the transport of coated pipes to the site and the laying procedure in the soil can damage the coating. Flexibility is important because PU-coated tubes in the field must endure bending and must withstand frost during winter in colder regions. High abrasion resistance of the coating is advantageous for withstanding soil stress.

The physical strength of polyurethane systems allows them to withstand mechanical forces longer, such as creep. These mechanical properties can be customized by varying the ratio of hard and soft segments, molecular weight and the crosslinking density of the cured film. Therefore it is possible to create different PU coatings with physical

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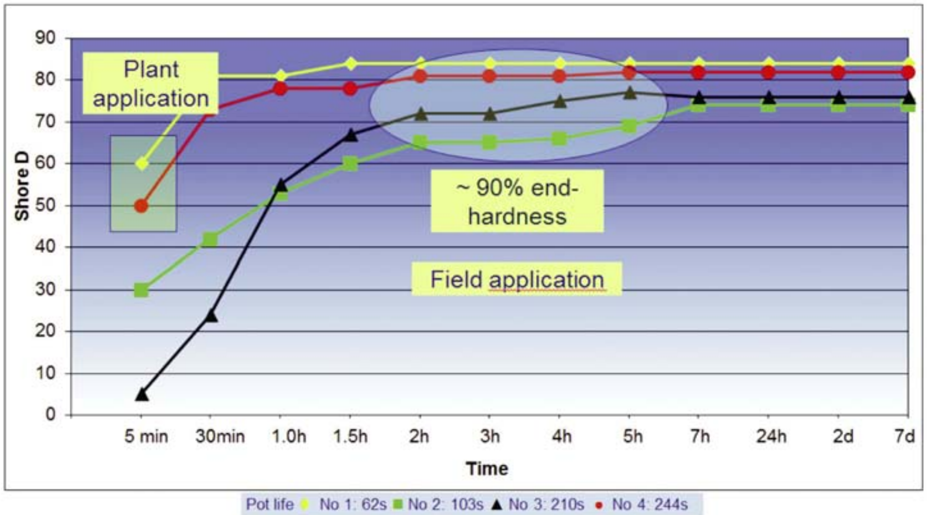

Fig. 1: Polyurethane pipe coating formulations can be adjusted for shop-applied or field-applied applications.
All images courtesy of the authors unless otherwise noted.

properties that can range from soft, plastic across elastic up to hard, rigid and even brittle.

Figure 2 (p. 35) displays the potential versatility in adjustment of mechanical properties of polyurethane coatings. It compares different polyurethane formulations in terms of flexibility – measured as elongation at break, and hardness – measured as Shore D. It is possible to achieve different films by varying elongation at break that ranges from roughly 5 percent up to roughly 130 percent. The elongation at break of standard polyurethane pipeline coatings ranges in between 10 percent and 20 percent.

By combining polyurethane formulations which provide different levels of hardness, it is possible to create a coating system resembling a polyurea system, with a hard primer plus an elastic layer; or a three-layer system consisting of a hard primer plus an adhesive plus an elastic polyethylene. As shown in Figure 2, using PU1 (hard primer) as the initial layer, PU4 as the intermediate coat and PU7 as the "elastic" finish coat, total film thickness of 1,000 µm, 3,000 µm, or even higher could be achieved. The advantage of such a paint system is its effective adhesion due to all components being of the same technology, PU onto PU.

DEVELOPMENT OF RIGID, TWO-COMPONENT POLYURETHANE COATINGS

Market requirements led to development of rigid, two-component polyurethane coatings by improving on already-established polyurethane raw materials. Desired attributes of this advanced coating included serviceability for buried pipelines positioned above- and below-underground-water level, short-drying time, short-curing time, single-coat suitability for direct-to-metal application, durability under harsh conditions, favorable cathodic-disbonding properties, favorable impact properties and straight mixing ratio.

Steps of development included screening of suitable building blocks; selection of the best candidates for extended testing for anticorrosion properties, adhesion, porosity and curing characteristics; working out start formulations for test coatings; working out straight mixing ratios and rheological profile. The develpment outcome is a "rigid" or "strucutral" class of PU pipeline coatings based on new polyols and polyisocyanate prepolymers.

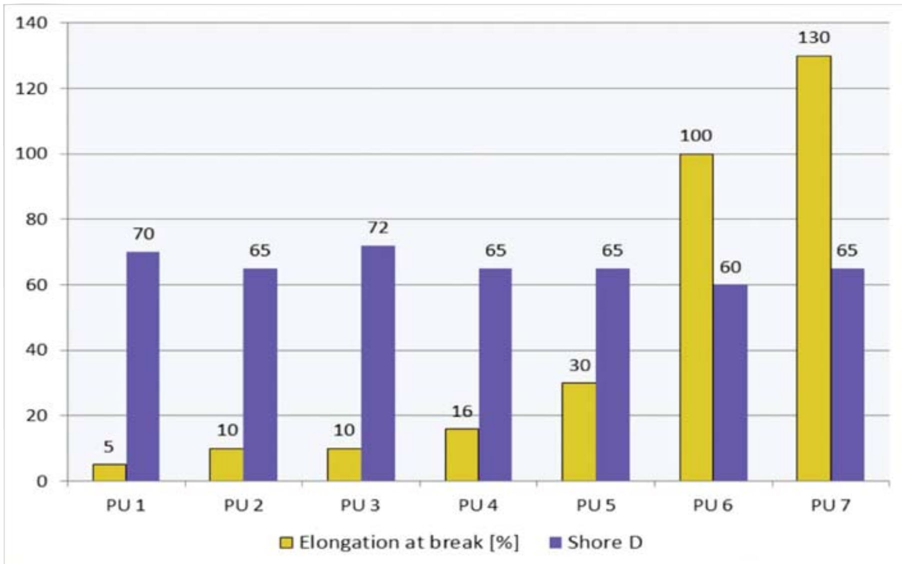

Fig. 2: High versatility for adjusting mechanical properties – elongation and Shore hardness

LABORATORY TESTING

Cathodic Disbonding Test

Various test procedures exist within the pipeline industry and have different requirements for voltage, temperature, salt solution and test period. The most regularly-used test methods follow standards ASTM G8, "Standard Test Methods for Cathodic Disbonding of Pipeline Coatings," and ASTM G42, "Standard Test Method for Cathodic Disbonding of Pipeline Coatings Subjected to Elevated Temperatures."

Polyurethane pipe coatings which provide higher crosslinking densities in the cured film usually pass the cathodic disbonding tests up to 65 C. The prepared surface, specifically the roughness profile after blasting, has an important influence on adhesion and cathodic-disbonding-test results. The minimum surface quality should be Sa 2.5 with a roughness minimum of 50–70 µm, and a recommended roughness of 80–100 µm.

Pipe coatings must fulfill certain cathodic-disbonding properties. Figure 3 (p. 37) illustrates a schematic design of a cathodic disbonding (CD) test. CD tests are used to evaluate the damaged coating's delamination behavior using conditions that model the service environment including cathodic protection, elevated service temperature, and salt solution (representing ground water).

Steel panels with different surface profiles (roughness) were tested at various temperatures. Coated steel panels were sent to an independent test institute for investigation of cathodic disbonding characteristics according to T/SP/CW/6 Part 1. The tests were carried out for 15 days at 80 C and for 15 days at 95 C. The electrolyte was maintained at 30 C in both tests. The results of these tests were approximately 3 mm disbondment after 15 days at 80 C and approximately 5 mm disbondment after 15 days at 95 C.

Figure 4 (p. 38) depicts the result of the cathodic disbonding test after 14 days at 80 C. The result in terms of adhesion and disbondment is very good at surface roughness of approximately 30µm. The requirement is normally 80–120µm. In this case it was not possible to lift the coating with a knife at the end of the test.

Film Hardness and Impact Test

One development goal was to decrease the time involved in the entire maintenance process, thereby reducing the time until backfilling of the coated pipe could take place. The Shore hardness formation is a good indicator of curing therefore measuring the hardness of the applied film over

Table 1: Measurement of Shore Hardness Over Time

Rigid Polyurethane	Shore D Hardness @ RT
After 1h	73
After 3h	78
After 5h	78
After 7h	81
After 9h	81
After 24h	82
After 48h	82
After 7 days	82

time can provide an informative assessment of mechanical performance (Table 1).

After coated samples of a start formulation had been successfully tested, two field trials were carried out. The field application was arranged in agreement with an oil and gas company in the Middle East. It was done to study and evaluate the new building blocks for rigid, two-component polyurethane coatings for external surfaces of oil and gas pipelines under real conditions.

Blasting

After shot blasting the surface with garnet, the profile measured Sa 2.5 and the average roughness was approximately 70 µm.

Application of the Test Coating

Two layers of the test coating were applied wet on wet with roughly 10 minutes of curing time in between the coats. Each layer was applied with 3–4 passes (Fig. 5, p. 40). The pot life measured three minutes and after about 30 minutes the coating was tack free.

The final inspection after application on-site showed that leveling and sag resistance was satisfactory. The dry-film thickness was measured with 1,650–1,900 microns. As no blisters or failures were observed, backfilling of the pipe was done three hours after application.

Inspection of the Test Coating

After 15 months in wet soil with high salt content, the pipeline was excavated and the rigid polyurethane test coating was inspected by experts from the participating oil and gas company. The coating was in excellent condition and did not show any damage, bubbles, rust or delamination (Fig. 6, p 40). The oil and gas company representatives

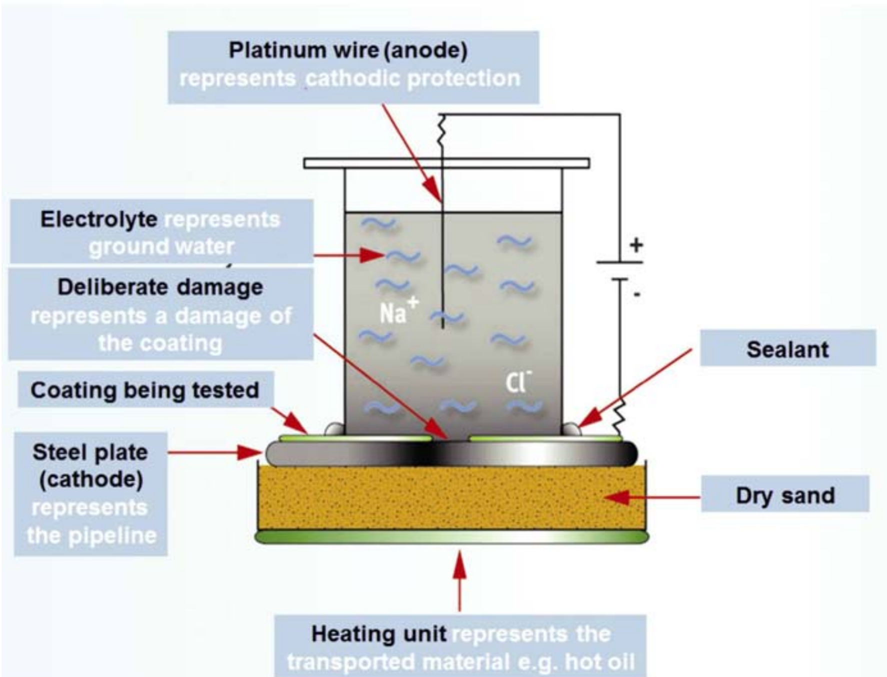

Fig. 3: Schematic design of the cathodic disbonding test

tried unsuccessfully to cross-cut the coating by using a chisel.

Comparison of Existing Coatings

This positive result prompted a comparison with existing solvent-free, aromatic, two-component polyurethane coatings also deemed suitable for pipelines above- and below-ground water level and specific service temperatures (Table 2, p. 38).

Rigid Polyurethane Type 1

By roughly comparing four cases in consideration of the crosslinking density of the cured film, the influence of the crosslinking network on the coating properties was apparent. The cured film of rigid polyurethane type 1 is highly crosslinked yielding exceptional cathodic-disbonding properties at temperatures of 80–95 C.

Pipe coatings generally have acceptable impact resistance of ≥8 J/mm at room temperature and Shore D hardness of 75 to 85. The rigid PU coating had a value of approximately 16 J/mm at Shore hardness of ca. D80. The rigid PU coating's highly crosslinked density imparts much lower water absorption than standard coatings and provides improved anticorrosion properties. The elongation at break is less than 10 percent which could yield less bending ability for new coated tubes in the field during the construction of a new pipeline, although it could be reasonable to bend uncoated tubes first and then apply the coating.

This material is potentially suitable for harsh conditions like high-ground-water level covering the pipeline, and also for higher service temperatures (>80 C). Backfilling with the test coating was done only three hours after application, which is considerably less than the typical duration. Furthermore, the test coating fulfills several requirements of the international epoxy standard EN 10289, "Steel tubes and fittings for onshore and offshore pipelines - External liquid applied epoxy and epoxy-modified coatings" (Table 3).

Table 3: Requirements of EN 10289 (selection)

Impact resistance	5 J x k x mm (23 C) mm of coating thickness
Adhesion test, pull-off method	7 MPa (23 C)
Cathodic disbonding test	Average ≤6 mm, max. ≤8 mm (28d at RT, 2d at 60 C)
Elongation	No requirement!

Rigid Polyurethane Types 2, 3 and 4

Coating types 2 and 3 are standard pipe-coating systems (also applicable for ductile iron pipes), existing in the market for decades with proven performance. These coatings are typically used for pipelines with service temperatures of up to 60 C and higher – depending on the formulation. As type 3 is a relatively hard coating, it might be a better option for colder regions with permanent frost because its increased flexibility could help prevent cracking and coating failure.

Table 2: Rough Comparison of Solvent-Free, Two-Component Polyurethane Coatings

Properties	1	2	3	4
Crosslinked Density	very high	high	medium	low
Mechanical Property	rigid	rigid-hard	hard-flexible	flexible-soft
Cathodic Disbonding*	++	+	0	- -
Elongation	<10%	≥10%	~20–30%	>100%
Shore Hardness	≥D75	~D70	~D60	<D30
Impact	+	++	++	++
Bending Properties	0	++	++	++
Adhesion	++	++	++	++

*at high temperature (>80 C)

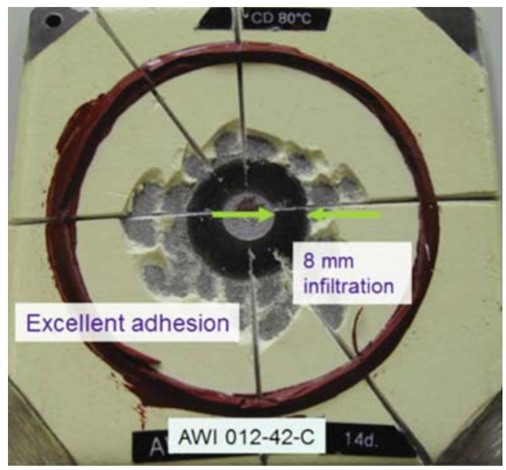

Fig. 4: Rigid polyurethane coating after cathodic-disbonding test for 14 days at 80 C

Table 4: New Polyols for Rigid Polyurethane Coatings

Polyol Property	Polyol 1	Polyol 2	Polyol 3	Polyol 4
OH content [wt. %]	12.1	14.2	16.7	18.8
Viscosity [mPas]	5,500	5,400	1,800	19,200
Density [g/cm^3]	1.06	1.02	1.04	1.02
Average Functionality	3.7	4	3	4

Table 5: New Polyisocyanate Pre-Polymers for Rigid Polyurethane Coatings

Property	Pre-Polymer	Pre-Polymer 2
NCO content [wt. %]	21.5	24
Viscosity [mPas]	400	220
Density [g/cm^3]	1.16	1.17

Type 4, an elastomeric, might be not a good contender as direct-to-metal pipe coating, especially at high service temperatures because the crosslinking density is low compared to the others, which has a direct negative impact on its corrosion protection and cathodic-disbonding properties.

New Raw Materials for Rigid Polyurethane

By combining the polyols shown in Table 4 with the polyisocyanate pre-polymers shown in Table 5 it is possible to achieve exceptional anticorrosion properties. The combination of polyol 1 and pre-polymer 1 was tested in the field under real conditions. In addition, it is possible to achieve mixing ratios of 1:1 and 2:1 by volume.

Fig. 5: Application of test coating in the Middle East

Fig. 6: Inspection of rigid test coating after 15 months. No defects or damages were observed.

CONCLUSION

Polyurethane pipe coatings are a versatile product class that can be tailored to meet a wide range of end-use applications. Varying the catalyst, crosslinker and polyol allows the coating formulator to develop a range of properties from elastomeric to rigid. A new class of rigid polyurethane pipe coating raw materials were developed to meet higher cathodic disbondment requirements and their performance under harsh, real-world conditions looks promising.

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Andreas aus der Wieschen studied chemistry with a focus on paints and coatings at the University of Applied Sciences, Krefeld. He joined Bayer AG in 1998 and has overseen the company's market development of polyurethane raw materials for pipeline coatings since 2009.

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Reinforced Storage Tank Linings: Advantages & Applications

By Matthew Fletcher
International Paint Ltd.

Steel storage tanks containing corrosive fluids need to be internally lined to prevent corrosion of the substrate and contamination of the liquid stored within. There are many reliable organic lining systems available, typically epoxy based, which can be used at new building; however, in general, these will need to be maintained to ensure the tank achieves its design life.

These same systems can also be used for maintenance painting. But what if corrosion has started in the tank base, leading to thinning of

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Photo courtesy of Švykai UAB

the steel plate or even the development of holes? The owner has two options: to replace the corroded steel, which is expensive and involves a long shutdown of the tank, or to use a reinforced lining.

There are a host of different types of reinforced tank-lining systems that can greatly influence the duration of shutdown time required to apply the lining, financially benefit the end user in the long run, and allow linings to be applied to tanks that have suffered significant amounts of corrosion damage.

Reinforced Linings

At new building, incorporating glass-fiber reinforcement into a lining offers a variety of benefits to the tank's owner, as the fiber adds both tensile and flexural strength to the lining. The lining's increased tensile strength improves its hole-sealing capabilities. If underside corrosion, for example corrosion of the bottom side of the tank base, were to cause the steel thickness of the tank base to be reduced below the minimum allowable level in localized areas, the lining could help prevent leakage.

This increased flexural strength allows greater movement of the tank base during loading and unloading. Simply applying a rigid thick-film system without reinforcement increases the risk of cracking of the lining due to movement of the tank base.

The reinforcement also allows the lining to be applied more thickly, again with reduced risk of cracking. This additional thickness will often lead to a longer service life of the lining due to the longer amount of time it will take a fluid to permeate the lining.

These properties can be of further benefit during tank refurbishment after the lining has been in service for years and reduced steel thickness and pitting corrosion are likely to be concerns.

The American Petroleum Institute's Standard API 650, "Welded Tanks for Oil Storage," is commonly followed by crude oil storage tank owners and refers to lining types and inspection intervals in API 652, "Lining of Aboveground Petroleum Storage Tank Bottoms," and API 653, "Tank Inspection, Repair, Alteration and Reconstruction."

In API 652 a thick-film tank bottom lining is described as having a thickness greater than 20 mils (510µm). Thick-film linings can also include fiberglass reinforcement to give the properties described previously. In API 653 it is stated that if a thick-film fiberglass-reinforced lining is used, the inspection interval can be longer than if a thin film

is used. API 653 allows inspection windows to be extended to over 20 years and lining manufacturers would normally recommend a thick-film fiberglass-reinforced lining if an extended inspection interval is to be used.


Fig. 1: Caulking and stripe coating completed


Fig. 2: Rib-rolling the reinforcement mat in a hand-lay system to remove entrapped air and ensure good wetting out

Increased inspection intervals reduce the frequency of the shutdowns a storage tank requires. This is often of great interest to the tank owner, as the downtime of the tank can mean lost revenue.

The method chosen to apply thick-film reinforced lining systems in storage tanks, and the type of lining, can also have an effect on the duration of the shutdown and the expected service life of the lining. The following section describes several of these systems.

Hand-Lay Mat Reinforced Systems

The traditional method of creating a thick-film reinforced lining system involves applying layers of the lining and incorporating sheets of glass-fiber mat by hand. A random chopped-strand mat has the advantage of not being uniform in nature and therefore not having any of the repeated weaknesses that a woven mat may exhibit. In hydrocarbon storage tanks a mat with a weight of 450 grams (15.9 ounces) per square meter (11 square feet) will often be used with a thick-film lining.

The hand-lay system is a labor-intensive exercise which has a slow application rate. After surface preparation, any pitting, corners, and weld areas are typically filled and smoothed using a thick caulking material, and then stripe coated (Fig. 1) prior to application of the first layer of lining. While the lining is still wet, the mat is laid into the lining, and a further layer of lining is applied on top of the mat. The lining is then immediately rolled with a ribbed roller (Fig. 2) to remove all excess air from the mat and to ensure the mat is fully wetted out with the lining.

If required, a second layer of mat may be applied. Once the lining has cured, it is good practice to sand the surface to ensure that any fibers protruding from the system are removed. A final gel coat (sealing coat) of the lining is then applied. If any fibers were to protrude through the gel coat, this would be a weak point in the system, as liquid could "wick" through the fiber and into the lining system.

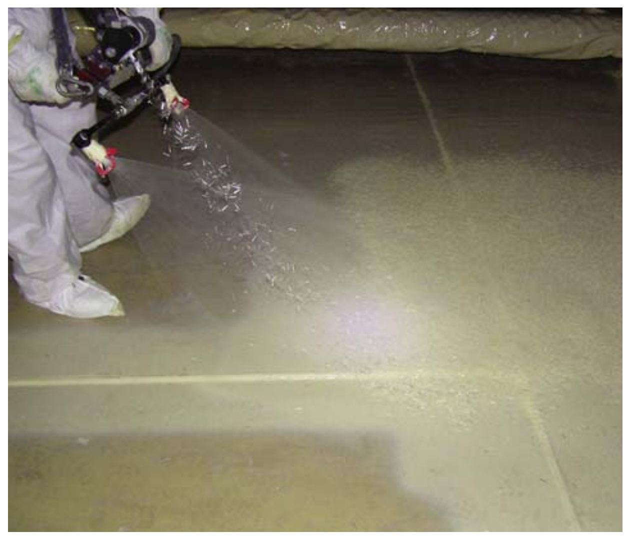


Fig. 3: Application of the spray-applied, chopped-strand system

Examples of Reinforced Lining Application

Figure 4 (p. 46) shows the application of the final gel coat of a spray-applied, chopped-strand lining system to a petrol storage tank in Lithuania. During the maintenance shutdown, it was found that the base of the tank had been heavily corroded in service. A reinforced system was employed and performed successfully resulting in the lining of 10 additional tanks using this system.

In Bahrain, a tank that had a spray-applied, chopped-strand lining system in service for 15 years required replacement of the tank base due to underside corrosion. Inspection of the lining system (Fig. 5, p. 46) showed it to be in good condition and providing excellent protection of the topside of the tank base.

In the U.S., a tank with the spray-applied, chopped-strand was inspected after 20 years in service, and the system was found to be in good condition. As there was minimal underside corrosion, the lining system was maintained and returned to service, anticipating another 20 years in service.

Fig. 4: Spray application of the gel coat in a spray-applied, chopped-strand system
Photo courtesy of Švykai UAB

Fig. 5: After 15 years in service, this spray-applied, chopped-strand system shows no defects during inspection

Spray-Applied, Chopped-Strand Reinforced Lining Systems

These systems use a mechanical chopper gun to incorporate the glass-fiber strands into the lining system during application. A specialized piece of equipment incorporates two lining spray nozzles and a chopper gun, which chops the glass fiber and fires it into the lining as it is spray-applied (Fig. 3, p. 44). As with the hand-lay system, this process requires application of caulking to fill and smooth any pitting, corners and welds before application of the reinforced system. The lining is then immediately rib-rolled to remove entrapped air. Once hard, the surface is sanded to remove any protruding fibers, and a gel coat is applied.

This type of system will normally have approximately 350 grams (12.5 ounces) of fiber reinforcement per square meter. Due to the fact that the reinforcement layer is applied far more quickly than a hand-lay mat reinforced system, a spray-applied, chopped-strand system can in general be applied two to three times faster than a hand-lay mat reinforced system, depending on the manpower available.

The lining is sprayed from nozzles positioned on either side of the central chopper gun. As the device is moved back and forth from left to right, the first spray nozzle wets out the surface, the gun applies fiber strands on top of the wetted surface, and the second spray nozzle applies a layer of lining on top of the strands as in Figure 3.

Examples of Predispersed Application

Figure 6 shows a hot crude oil storage tank in the UK, which operates at 85 C (185 F). Due to severe corrosion of the base, the owner wanted a reinforced lining with high-heat resistance. The advanced epoxy novolac with predispersed reinforcement fibers was selected, as it fulfilled the customer's primary requirements. The system also offered the commercial benefits of quick application and cure, greatly reducing the time that the tank would be out of service as well as the associated expense from loss of income.

Figure 7 (p. 50) shows a section cut out of the base of a crude oil storage tank taken out of service in Kuwait after eight years in service. Because of underside corrosion, the owner had decided to replace the tank base. The coated section was inspected in the laboratory, and the adhesion was tested to see if any degradation of the lining had taken place. The minimum recorded adhesion value was 19 MPa (2,755.7 psi) showing excellent adhesion to the steel and no degradation of the lining. Adhesion values of close to 10 MPa (1,450.3 psi) would have been considered acceptable; therefore, the performance of the lining was exceptional.

Fig. 6: Application in one thick layer of advanced novolac with predispersed reinforcement fibers

Predispersed Fibers

Also available is an advanced epoxy-novolac system with predispersed reinforcement fibers. The system offers a thick-film, fiber-reinforced lining as per API 652, but because the reinforcement fibers are included in the wet paint during production, the lining system can be applied in one single, thick layer (up to 2 mm in thickness). This greatly reduces application time, and it can be applied two to three times more quickly than the spray-applied, chopped-strand system.

Stripe coating and caulking is carried out with the lining itself, which is applied wet-on-wet over the stripe coating and caulking. Using heated, plural airless-spray equipment, the rapid application rate of this type of system can reduce the required shutdown period by many days, providing significant cost savings to the owner. The disadvantage of this system is that it does not have the same high strength of the hand-lay or spray-applied systems described previously, but laboratory testing and performance in actual service have proven that this type of thick-film lining can offer long-term performance and hole-bridging capability.

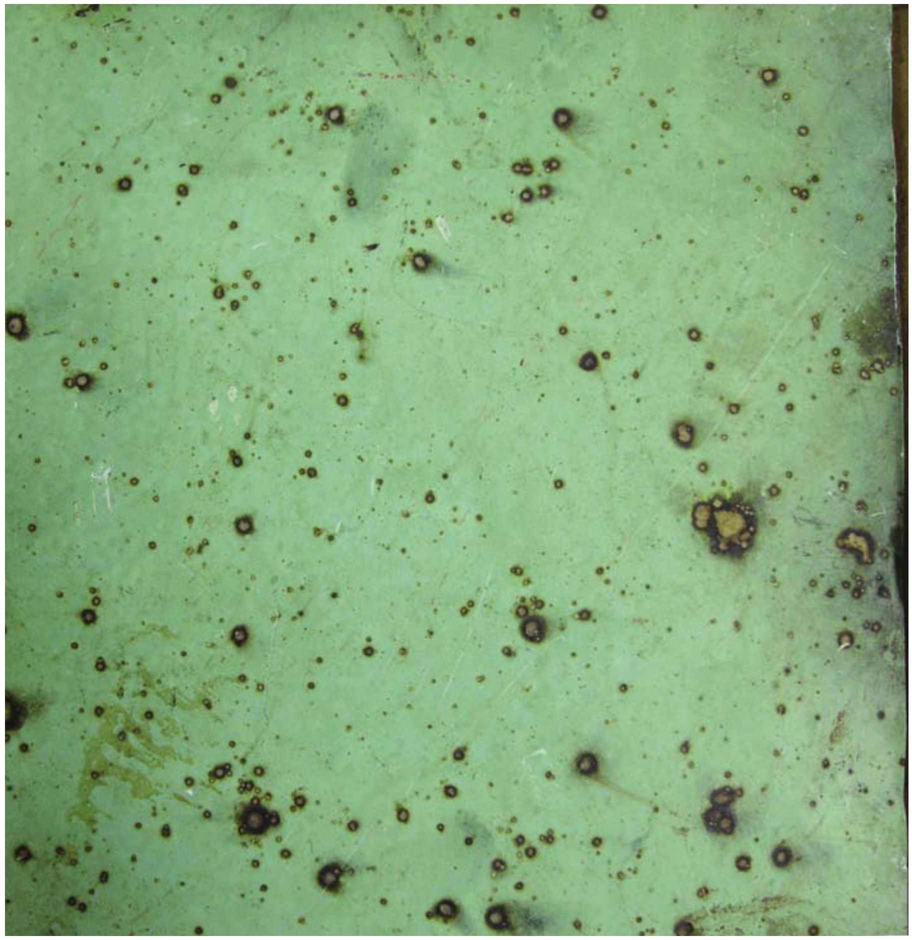


Fig. 7: Advanced novolac with predispersed reinforcement fibers after eight years in service. (This image was taken before laboratory testing of adhesion. The black marks are burn marks made during the cutting of the steel section from the bottom of the tank.)

Summary

Thick-film reinforced lining systems offer owners and operators significant cost savings by extending the time between shutdowns and this is supported by the American Petroleum Institute. Thick-film reinforced lining systems allow linings to be applied to tanks that have suffered significant amounts of corrosion damage. The different application methods and types of reinforced systems can greatly influence the duration of shutdown time required to apply the lining.

The different types of reinforcement systems feature different levels of glass fiber, which can affect the physical strength of the lining; however, all of the systems described in this article have shown proven fitness for purpose.

About the Author

Matthew Fletcher earned a Master of Mechanical Engineering degree from the University of Newcastle upon Tyne, England in 1997. He has 15 years of professional experience working in the protective coatings industry specializing in corrosion under insulation and tank linings. Matthew joined International Paint Ltd., a part of AkzoNobel, in 2006. JPCL

As part of the push to better protect the environment by establishing alternative energy sources for the future, offshore wind farms have become an increasingly popular approach for producing cleaner energy – particularly in Europe. These wind farms consist of a series of wind towers mounted on top of steel foundations that are driven into the seabed. Like offshore oil and gas platforms, these wind farms are exposed to harsh, corrosive conditions including seawater exposure, wet-dry cycles and temperature variations; and protective coatings are an effective way of shielding these structures from the conditions they face.

Topsides, jackets and other accompanying components for offshore wind farms have large dimensions and weights that cannot be accommodated within most paintwork facilities. Accessibility in terms of height and width is also a huge challenge with respect to safety. The design of scaffolding or the application of special cherry pickers has become a specialty in order to keep the production process under control.

This article describes shop coating the large steel jacket foundation members employed at the Thornton Bank Wind Farm project, recipient of the E. Crone Knoy Award at the SSPC 2014 Structure Awards.

About Thornton Bank

The Thornton Bank Wind Farm, owned and operated by C-Power N.V., is an offshore wind farm located 19 miles from the Belgian coastline on a sand bank in the North Sea. It consists of 54 wind turbines, which produce a total of 325 megawatts of power – enough for 300,000 families, according to the C-Power website.

Construction of the wind farm took place in three phases, beginning in 2007. The first phase included just six turbines, while the additional 48 were installed during the second and third phases. The third phase wrapped up in July of 2013, making the wind farm fully operational.

The wind towers are placed on top of steel jackets, which are driven into seawater that ranges from 12 to 27 meters (40 to 90 feet) in depth. The turbines stand 157 meters (515 feet) tall, and their rotors have a diameter of 126 meters (413 feet).

Jacket Configuration

During the second and third phases of the project, the contractor was responsible for fabricating and coating 48 steel jacket foundations for the wind turbine towers and one additional steel jacket foundation for an offshore transformer station. This fabrication required the use of large, modern blast and paint facilities before the parts could be loaded onto a barge and sent out for installation at the wind farm.

The jacket foundations consist of a steel jacket with four legs that is assembled in several different pieces including:

- The midsection (or transition piece) between the main jacket and the wind turbine tower section, upon which the rotors are mounted;
- The main jacket part;
- The pile stoppers (four per jacket), which connect the main jacket and the pinpiles; and
- Secondary steel elements such as anodes, boat landings and ladders.

In total, the contractor produced the 48 jackets over a two-year period. The steel jackets weighed a total of 27,840 tons and were painted using 96,000 liters (25,360 gallons) of epoxy and polyurethane coatings. In the end, the contractor logged a total of 32,000 man-hours for blasting and 144,000 man-hours for stripe coating, masking and painting.

Blast and Coat Facilities

The jackets for the Thornton Bank project were blasted and coated in the contractor's three large blasting and painting facilities in Belgium: Iemants in Arendonk, Willems in Balen and Smulders Projects Belgium in Hoboken.

Secondary steel was coated at Iemants in Arendonk and the midsections were painted in Balen at the Willems facility. The jacket legs and bracings were welded together according to a 3-D model and painted in the new paint shop at Smulders Projects Belgium in Hoboken after the midsections were secured to the rest of the jacket. These facilities have special features which are described as follows.

Arendonk Facility

Iemants in Arendonk has a workshop area covering over 50,000 square meters (538,200 square feet). In addition to components for offshore platforms and towers, Iemants produces parts for bridges and buildings. The blasting cabin is 40 meters (131 feet) long, 10 meters (33 feet) wide and 8 meters (26 feet) tall. The cabin is located next to the production hall so that transport carts can be driven directly into the blasting cabin. After blasting, these carts go to the paint shop through the back of the blasting cabin.

Balen Facility

The midsections for the Thornton Bank jackets were assembled, blasted and painted at Willems facility in Balen. This facility's recently built paint shop covers 2,430 square meters (26,147 square feet). Inside, there is

In-Shop to Offshore:

Shop Coating Steel for the Thornton Bank Wind Farm

By Ronny Van Poppel, Project Staff, Smulders Group

After fabrication and coating, steel jackets were placed offshore at the Thornton Bank. All photos courtesy of Ronny Van Poppel, Smulders Group

a blasting cabin of 352 square meters (3,788 square feet) with a height of just over 7.6 meters (25 feet). The roof of the blasting cabin can be opened completely so that larger pieces can be placed inside using the overhead crane. The blasting installation was constructed in 2011 and four to six blasters can work simultaneously. In order to facilitate this, an adapted dust suction device was also constructed, with a capacity of 85,000 cubic meters (3,001,775 cubic feet) per hour.

Hoboken Facility

The third and largest production facility is Smulders Projects Belgium, located in Hoboken. This facility is divided into three sections, including two production halls and a dry dock and storage yard.

The first production hall is 12,000 square meters (129,168 square feet). This hall contains blasting and paint workshops, with a roof that opens in eight sections so that parts can be lowered in using overhead cranes.

The blasting cabin is 44 meters (144 feet) long, 15 meters (49 feet) wide, and 15 meters high. Four blasters can blast manually, but there is also a robot that can take over the blasting work. The robot is used for items that have common dimensions and is controlled entirely by computer. The dust suction capacity amounts to 24,000 cubic meters (847,560 cubic feet) per hour.

This facility is mainly used to coat transition pieces for offshore wind farms. These transition pieces are placed on top of a monopile, which is drilled into the seabed. The transition pieces have an upper flange upon which the wind tower is mounted, as well as working platforms inside and boat landing areas on the outside. They are also equipped with J-tubes for electrical cables.

A typical transition piece weighs approximately 240 tons, has a 6-meter (20-foot) diameter and is 30 meters (98 feet) long. A transition piece such as this undergoes a NORSOK standard system treatment, which means that three coats are applied to the outside and two to the inside. (NORSOK is a Norwegian acronym for the Norwegian shelf competitive position, a project conceived in order to reduce implementation time and costs for construction and operation of offshore installations on the Norwegian continental shelf.)

(Top of page and above): Individual steel members are brought to one of the contractor's large blast and paint facilities, where they are welded together, blasted and coated.

The components are coated as soon as possible after the blasting check, which is conducted according to ISO 8501-1, "Preparation of steel substrates before application of paints and related products." Dusting, taping and providing the necessary stripe coat are time-consuming processes that can only be done manually. The transition piece and its corresponding attachments must be coated properly; no single spot can remain insufficiently covered with paint. The tubular section, with attachments, is lifted into the blasting area and completely cleaned. It is then transported to the dedicated and conditioned paint area.

The 48 main jacket parts for the Thornton Bank project were primarily painted in the second production hall. At 14,720 square meters (158,387 square feet) and 35 meters (115 feet) high, this facility accommodates the largest of items. Inside, there is a blasting cabin with removable doors so that the heavy pieces can be transported from the blasting cabin to the paint shop. The roof opens providing access to the gantry crane allowing components weighing up to 500 tons to be lifted in.

The blasting cabin is 56 meters (184 feet) long, 26 meters (84 feet) wide and 23 meters (74 feet) high allowing four to six blast to work at the same time. The dust suction system operates at high efficiency affording blasters increased visibility. Cherry pickers are used to blast at heights and are placed between the items by the overhead crane.

The paint shop has the same dimensions as the blasting cabin and contains moveable scaffolding on each side which can be adjusted to fit the shape of the construction. Cherry

The contractor's facilities had enough space to accommodate the largest items for blasting and coating, including the main jacket sections.

pickers can be used to access the insides of the jackets.

Outside the paint shop, the site has access to the harbor basin, which can accommodate coasters and barges. Once the jackets for the Thornton Bank were finished and coated, they were transported to this area, loaded onto barges and shipped offshore for placement.

The Paint Spec

The paint specification, developed by the contractor and the coating manufacturer, called for two coats of a two-component, low-VOC, high-solids modified epoxy barrier coat, designed to give long-term protection, applied at dry film thickness of 375 microns per coat; and a topcoat of a two-pack, acrylic polyurethane finish, providing excellent durability and long-term "recoatability" with a dry film thickness of 80 microns.

SSPC Structure Award

In 2014, this project was awarded SSPC's E. Crone Knoy Award at the annual Structure Awards ceremony. This award, named after the late founder of Tank Industry Consultants, recognizes coatings work that demonstrates innovation, durability or utility. It is given for outstanding achievement that may include

(Above and below): Finished jackets were loaded from the facility onto barges and then shipped out for placement at the Thornton Bank.

excellence in craftsmanship, execution of work or the use of state-of-the-art techniques and products to creatively solve a problem or provide long-term service.

The complexity of the project, along with the challenges the contractor and subcontractors faced regarding production, worker safety and meeting deadlines, are among the reasons this project was chosen as the award recipient.

About the Author

Ronny Van Poppel is a project staff member for Smulders Group, a steel construction contracting company based in Belgium that specializes in wind turbine construction. He has almost 40 years of experience in the industry and is an SSPC Protective Coatings Specialist, an SSPC Bridge Coating Inspector and a NACE Level 3-certified Coating Inspector. **JPCL**

New NLB Waterjet Boosts Safety with Distance

NLB Corp. has introduced a new semi-automated waterjet system that lets the operator safely work multiple accessories from a climate-controlled cab.

The Automated Remote Manipulator (ARM) allows operators to keep their distance from the waterjetting action by using joystick controls to position, start and stop the flow of high-pressure water (up to 40,000 psi, or 2,760 bar, at 600 hp), the company says.

Courtesy of NLB Corp.

Specialized tooling is mounted on the arm of a mini excavator, allowing the machine to handle diverse applications such as shellside tube bundle cleaning and hydrodemolition, according to NLB Corp. There is a quick-connect system for changing accessories.

The system has a vertical reach of about 12 feet and a horizontal reach of about 17 feet, with a wide waterjet pattern, according to the company.

The company also recently introduced a new tube cleaning nozzle for ultra-high-pressure applications. NLB Corp.'s new RPN4009 is a self-rotating waterjet nozzle for cleaning pipes and tubes at pressures up to 40,000 psi (2,760 bar).

The nozzle works at a maximum flow of 9 gpm (34 lpm) and rotates at 7,000 rpm. It is coated with titanium nitride and can be ordered with cutting/cleaning or polishing heads, the company says.

The nozzle is designed for a minimum pipe diameter of 0.75 inches and is the first nozzle in the Typhoon 10 series to operate at ultra-high pressure, according to the company. The Typhoon 10 series includes four other waterjet nozzles for pressures from 15,000 psi to 24,000 psi (1,035 bar to 1,656 bar).

For more information, visit nlbcorp.com.

Guzzler Updates Vacuum Loader

Guzzler Manufacturing has updated its classic industrial vacuum loader with an optional vane pump pressure offload system. The option allows the Guzzler CL (Classic) to handle liquid waste and slurries in industrial cleaning environments such as materials processing plants, foundries, grain elevators, metal mining, steel and pulp and paper mills, railroads and shipyards. The company also recommends the equipment for oil and gas applications, including removal of drilling mud, clean-up and recovery of raw material, oil sludge and water removal, frack tank cleaning and general tank cleaning.

Courtesy of Guzzler Manufacturing

The product can pressurize the debris body at a maximum of 14.5 psi for offloading liquids and sludge, according to product manager Ben Schmitt. Schmitt said the vane pump could also be reversed to create a vacuum "of up to 28.5-in. Hg for vacuum loading of liquids and slurries that otherwise could not be loaded with an air mover."

Depending on the material type, the industrial vacuum loader can operate in remote or inaccessible locations more than 1,000 feet away, according to the company.

For more information, visit guzzler.com.

The chapter raffled off several items, including two DFT gages, a Fischer MP0R that was donated by KTA-Tator, Inc., and a DeFelsko 6000 series that was purchased by the chapter at a highly discounted rate from DeFelsko. SSPC provided Visual Reference Guides and SSPC logo wear, and each registrant received a copy of the SSPC Pocket Guide to Coatings Information courtesy of the chapter. According to chapter Chair Dan Zavesky and Treasurer Burt Olhiser, the event was a smash hit with all who attended.

SSPC Holds First Applicator Certification Program in Spain

SSPC held its first-ever Abrasive Blasting Program (C7), Spray Application Program (C12) and Water Jetting Program (C13) in Europe. These programs were hosted by Navantia Ship Yard in Cadiz, Spain, from July 9–18, 2014. According to Alejandro Exposito, who organized the event, “SSPC's first offering in Spain for the craftsman certification effort was received with respect, honor and pride by each individual that participated in the certification process.”

This 10-day training and certification event gave 20 craftsmen from the region the knowledge, training and guidance to be certified as industrial coating applicators. Navantia was required by the U.S. Navy to implement SSPC's C7, C12 and C13 Applicator Certification Programs for their subcontractors. The subcontracting companies who attended this program are Gaditana, Siasa and Indasa.

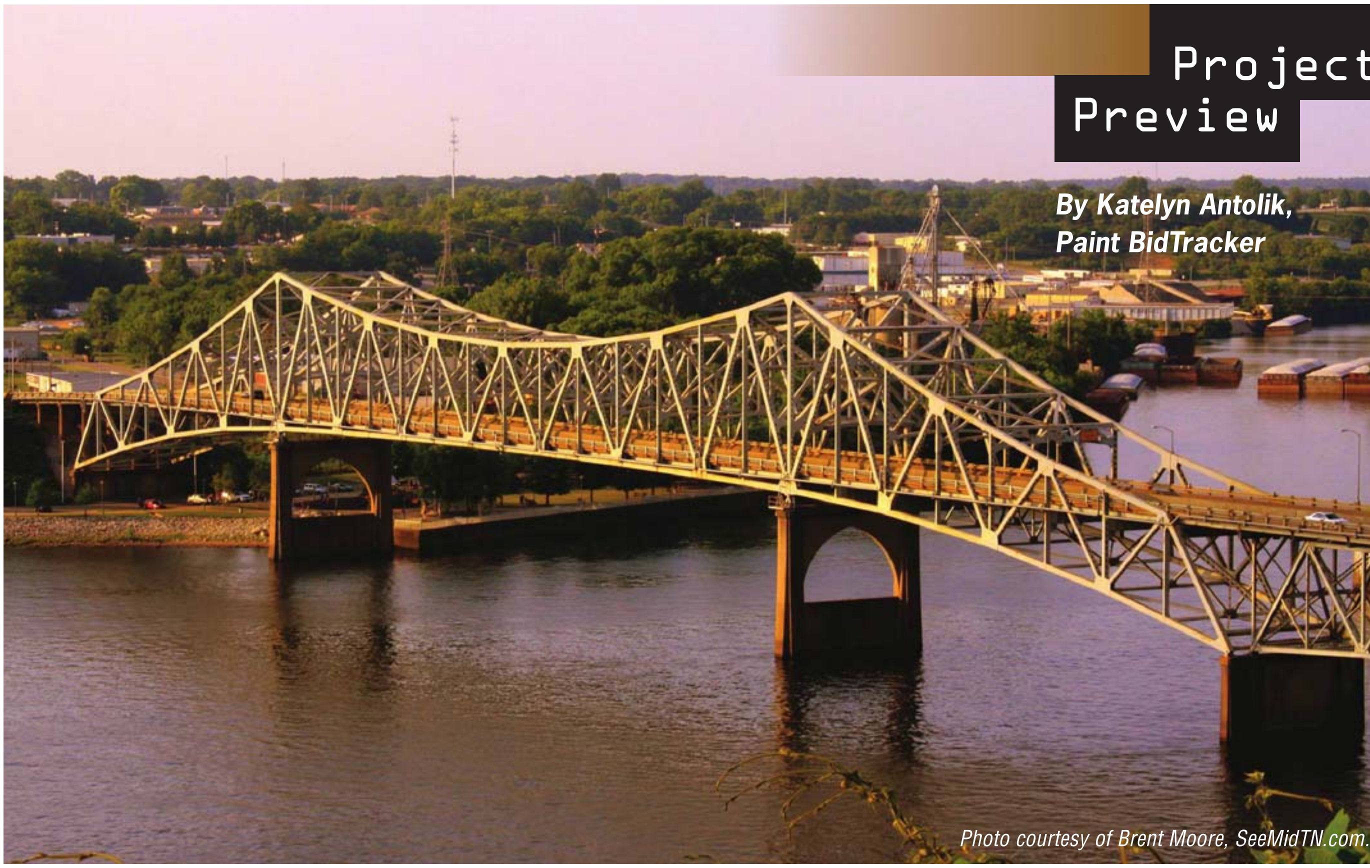
The candidates were competent and highly experienced as they demonstrated the skills required to prepare and apply protective coatings to complex industrial and marine structures. Each strived to meet the SSPC surface preparation standards and did very well in the hands-on phase of the assessment.

Grupo Otec (Optimiza and Otec Riera), who are Patron Members of SSPC, were absolutely phenomenal in the set up and organization of the programs, said Dan Buelk and Frank Saunders, the SSPC instructors at the event. “Alejandro and his team's enthusiasm, capability, knowledge and skill-set continued to impress us each day.”

During the programs, representatives from the Rota U.S. Navy Base visited the site. Their interest in witnessing this initiative reiterated the importance of the successful completion of these SSPC “just-in-time” training and certification programs to all involved. The representatives were also impressed with the complexity and effort required by everyone involved to obtain the certification.

SSPC looks forward to continuing to cooperate with Grupo Otec (Optimiza and Otec Riera) on future SSPC training and certification programs in Spain.

SSPC instructors Dan Buelk (top row, fourth from right) and Frank Saunders (second from right) with students from SSPC's first-ever Applicator Certification Program in Spain.



By Katelyn Antolik,
Paint BidTracker

Photo courtesy of Brent Moore, SeeMidTN.com.

Quick Hits:

- Oregon State Bridge Construction, Inc. (Aumsville, Ore.) has been awarded a $16,703,467.30 contract from the Oregon Department of Transportation to repair, clean and recoat two bridges over Old Young's Bay and the Lewis and Clark River.
- The Massachusetts Department of Transportation and Prime Coatings, Inc. of Salisbury, Mass. (SSPC-QP 1- and -QP 2-certified) have agreed on a $2,983,800 contract to repair, clean and recoat five bridges over Interstate 90 and the CSX/MBTA Railroad.
- Bleigh Construction Company (Palmyra, Mo.) won a $997,753.20 contract from the Missouri Department of Transportation to rehabilitate and recoat structural steel and concrete surfaces on four bridges.

Monoko, LLC Awarded O'Neal Bridge Rehab Contract

Monoko, LLC of Tarpon Springs, Fla. (SSPC-QP 1- and -QP 2-certified) won a $9,843,221 contract from the Alabama Department of Transportation for the rehabilitation, cleaning and recoating of the historic O'Neal Bridge.

Named for Governor Edward A. O'Neal, this Warren through truss bridge was constructed in 1939 and crosses the Tennessee River between Florence and Sheffield, Ala. Before the O'Neal Bridge, the Tennessee River was covered by the Old Railroad Bridge, which opened in 1840 and served the Norfolk-Southern Railroad Company while doubling as a toll bridge.

This contract will cover the abrasive blast cleaning and coating of approximately 505,000 square feet of structural steel. The contractors will abrasive blast clean the steel to a Near White Metal finish (SSPC-SP 10) and will follow with application of an inorganic zinc-rich primer, an epoxy intermediate and a polyurethane finish. Containment is required to capture the existing lead-bearing coatings.

The contract also includes shop-priming and field-finishing of 9,000 pounds of structural steel, which will be coated with an inorganic zinc-rich primer, an acrylic intermediate and an acrylic finish. Contractors will also perform Class 2 finishing of 40,000 square feet of concrete surfaces.

Monoko beat out seven other bidders for this contract; the second-lowest bid came in at $13,436,949, and the highest bid was for $19,086,962.50.

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Sept. 6 PCI Level 3, Singapore
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Sept. 6–7 C13 Water Jetting, Norfolk, Va.
Sept. 8 Estimating, Newington, N.H.
Sept. 9–10 C10 Floor Ctg Basics, Cincinnati, Ohio
Sept. 9–11 Plural Comp App, Rowlett, Texas
Sept. 10 PCI Workshop, Houston, Texas
Sept. 11 Using PA 2, Houston, Texas
Sept. 13–14 C7 Abrasive Blast, Norfolk, Va.
Sept. 15–19 NBPI, Jacksonville, Fla.
Sept. 15–20 PCI Levels 1/2, Newington, N.H.
Sept. 16 Thermal Spray, Kent, Wash.
Sept. 17 Using PA 2, Honolulu, Hawaii
Sept. 17–18 C12 Airless Spray, Ventura, Calif.
Sept. 17–19 Plural Comp App, Kent, Wash.
Sept. 18–19 QCS Qual Cntrl Spvr, Honolulu, Hawaii
Sept. 19–20 C14 Marine Plural Comp Prgm, Norfolk, Va.
Sept. 19–20 C7 Abrasive Blast, Ventura, Calif.
Sept. 21 PCI Level 3, Newington, N.H.
Sept. 22–23 ATT Train-the-Trainer, Zephyrhills, Fla.
Sept. 22–24 Ctg Spec Essentials, Houston, Texas
Sept. 22–25 C3 Lead Pt Removal, Irving, Texas
Sept. 22–27 BCI Levels 1/2, Cleveland, Ohio
Sept. 22–27 PCI Levels 1/2, Balikpapan, Indonesia
Sept. 23–24 C10 Floor Ctg Basics, Lakewood, Wash.
Sept. 24 CAS Refresher, Seattle, Wash.
Sept. 25 CAS Level 1, Seattle, Wash.
Sept. 25–26 CAS Level 2, Seattle, Wash.
Sept. 25–26 Insp Planning & Doc, Houston, Texas
Sept. 26 C5 Lead Pt Removal, Irving, Texas
Sept. 27 Lead Pt Worker Safety, Irving, Texas
Sept. 28 PCI Level 3, Balikpapan, Indonesia
Sept. 29–30 C7 Abrasive Blast, Newington, N.H.
Sept. 30–Oct. 1 C7 Abrasive Blast, Seattle, Wash.

Conferences

Sept. 3–5 Asia Pacific Coatings Show 2014, Jakarta, Indonesia
Sept. 6–9 60th PCI (Precast/Precast Conc Inst) Conv & Nat'l Bridge Conf, Washington, D.C.
Sept. 8–12 EUROCORR 2014 Euro Corrosion Congress, Pisa, Italy
Sept. 10 JPCL Europe Marine Coatings Conf, Hamburg, Germany
Sept. 9–11 CONSTRUCT 2014, Baltimore, Md.
Sept. 16–18 PCI (Powder Ctgs Inst) Powder Ctg Show 2014, Indianapolis, Ind.
Sept. 21 – 25 NACE Corrosion Technology Week, Alexandria, Va.
Sept. 22–24 Polyurethanes Tech Conf (CPI), Dallas, Texas
Sept. 23–25 Eurocoat 2014, Paris, France
Sept. 27–Oct. 1 WEFTEC, New Orleans, La.

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