

# TANK STORAGE

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# A COST- AND SAFETY-CONSCIOUS APPROACH TO COATING TANK EXTERIORS

Paul Cook, of Painters USA, examines best practices for facility and terminal managers

**> SURVEYS** and testing are vital for delivering safety, savings and long-lasting surface coatings, regardless of where a tank is located. Here's an example: A facility manager invited a certified NACE Institute inspector and instructor into his facility to quote a project for sandblasting and coating a tank. As the inspector examined the tank, which contained sulfuric acid, he noticed a few, almost imperceptible, spots flaking off. The tank's top revealed slight areas where the steel had swelled (Figure 1). The inspector immediately asked if anyone had inspected the tank via ultrasonic testing (UT) to detect and pinpoint discontinuities and get a measurement of the tank's wall thickness.

It is critical to use UT to check steel welds and metal thickness – a contractor can only blast so much. The inspector next asked if the facility manager had conducted testing for salt (e.g. chloride, sulphate, nitrate). Abrasive blasting can force salts into new areas of a tank's surface and coating, which then draws in moisture and undermines a new coating. The inspector ultimately found a high level of salt on the surface of the tank due, in part, to the service environment.

There are two service environments for tanks. The first is the air around the tank. The second is the tank's interior, what the tank holds. The focus of this

article is a tank's external coating. For tank farms, the tank maintenance group and other technical specialists generally plan, estimate, budget and execute tank maintenance including above-ground coatings as well as where the coating and turnaround work occurs. Coating work is a fraction of the annual tasks a tank team tackles. But giving coating work careful consideration reaps outsized returns.

In fact, facility and terminal managers can boost their ability to protect their tanks and budgets, and spot not-so-obvious issues, with the following best practices.

## GET TO KNOW, HIRE (OR BECOME) A CERTIFIED CORROSION CONSULTANT

As soon as a maintenance worker spots an area of, say, pinpoint rust, it's time to address it. One way is with expert advice. If you don't have a corrosion expert, then visit the NACE International Institute's website and find a certified corrosion professional to assess the situation and recommend a fix. Or search [www.corrosionpedia.com](http://www.corrosionpedia.com) for a consultant. Another option is having a team member obtain a NACE certification. For pinhole rust, a corrosion professional might suggest a three-coat system for preventing microscopic gaps. Coatings inherently have microscopic pinholes not apparent to the naked eye.

This occurs when very small bubbles stay intact during the drying process. When the bubbles 'pop,' the coating is too far along in the curing process to flow in and fill the pinhole left by the bubble. Two coats will eliminate 95% of this issue, and the odds are very low that pinholes in the first coat will line up with the second coat. A three-coat system eliminates this issue (see Figure 2). A Holiday Test performed by a facility or a qualified third-party will ensure no pinholes are present.

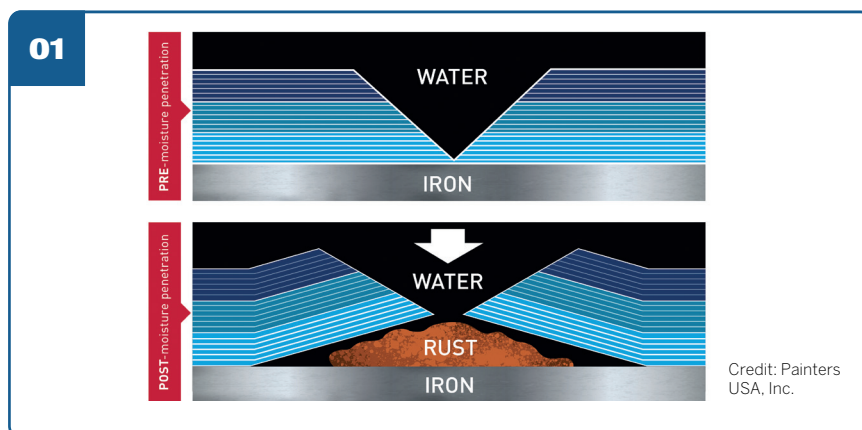
Another potential problem occurs when coating something with a sharp angle, such as areas behind bolts or on threaded areas. Corrosion experts recommend that contractors apply two additional coats by brush to protect the steel surface because a drying coating will pull away from the surface on which it is applied.

## ONE SIZE (OR ENVIRONMENT) DOES NOT FIT ALL

Consider the service environment in which a tank exists. Think of the harsh conditions at an offshore application versus the relatively mild climate in southern Europe or the US Midwest. That said, in a large facility with 500 or more tanks, there could be several variations in the service environment. One portion of the facility could be under the flight path of commercial aircraft. In that case, spent hydrocarbons from the airplanes might settle on the tanks' surface and exacerbate rust. From an engineer's perspective, rust is corrosion. And corrosion causes a loss of the tank's pressure-containing barrier, reducing the tank's wall thickness. Maintenance professionals should assess a facility's service environment in many ways and consider different schedules for cleaning the exterior of a facility's tanks, especially if the facility covers a large area.

## BEGIN WITH JOB SPECIFICATIONS

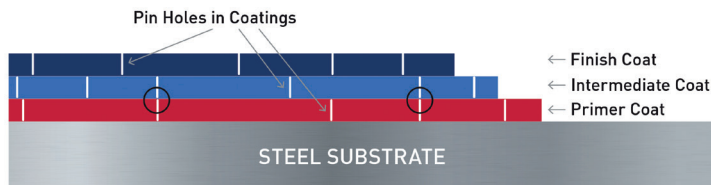
One way to save time and money and ensure a successful coating project is



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## LAYERING THE COATING IS CRITICAL

Credit: Painters USA, Inc.



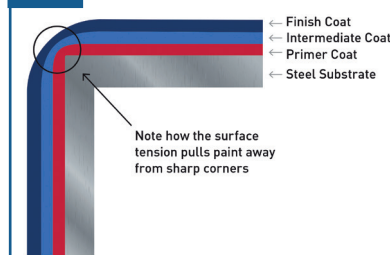
All layers of paint have pinholes which are direct paths for water to reach the substrate. The application of additional coats keeps the pinholes from lining up with one another.

by developing a proper job specification for a contractor. A bona fide job specification addresses the approach to (and ramifications of) a cleaning and/or coating project at a location in the facility. For example, the job specification might state the contractor will paint a tank near an employee parking lot. Due to the proximity of the lot, the contractor will have to consider the implications of an abrasive blast. The specification will also address whether the steel surface is old and corroded or, perhaps, pitted. Or the specification might describe the tank's position relative to a tank farm's control room filled with computers and nearby tanks requiring protection for their respective intakes. Written into a job specification are also the kind of materials and techniques a contractor will use. For example, does the project need to be brushed and rolled to avoid debris and overspray from getting to the parking lot?

Qualified individuals with corrosion and coatings know-how should write job specifications. Facility owners don't always know they need this level of preparation. Often, an unqualified contractor will specify the wrong system. Consultants and coatings experts, some of whom can be found through a routine

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Credit: Painters USA, Inc.



search via LinkedIn using phrases like 'coating consultant,' or 'non-metallic coating expert,' are one source for developing successful job specifications. A local paint vendor specializing in industrial coatings can be a resource, too.

## INCLUDE QA IN YOUR PROCESS

Let's say a contractor recommends removal of the exterior coating on a tank because of excessive rust or the tank has been coated a number of times and the thickness exceeds 20 mils (0.5 mm), which would indicate it's time to start again. When the contractor begins to blast the

tank, there must be a specified blast profile left behind, so the new coating will properly adhere to the tank's surface. Ensuring that happens requires a blast profile measurement that can be performed with a 'profile tape,' or a newer electronic gauge. The measurement of the profile is important for achieving the specification and ensuring the blast cleaning process is controlled and producing an adequate coating profile height. The contractor or third-party inspector should record the mil thickness of the new coatings to verify that the contractor is meeting the specifications. To successfully complete a job, a company can hire a third-party quality assurance (QA) expert to report daily on ambient weather conditions, wet film thickness tests and the blast profile. Qualified contractors should also record daily conditions and QA measurements to meet the project specifications.

## PARTING THOUGHTS

Whether a city's or town's requirements drive a facility to maintain the exterior coatings on its tanks (e.g. some parts of California require tank owners to paint their assets to blend in with the colour of nearby mountains) or a conscientious facility owner pushes the effort, the employer's maintenance team plays the critical role in spotting conditions and recommending remedies. When a good maintenance team reports on rust staining or the failure of the coating system, facility owners must respond with a solution that includes surveys, testing, well-planned specs and QA. A company's profits and the safety of its workers, equipment and cargo depend on it.

## For more information:

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Credit: Painters USA, Inc.

- 01 When iron or steel rusts it can expand up to 23 times its original size, putting pressure on a coating
- 02 A layered approach to coating a tank exterior is critical for building a barrier between the tank wall and weather
- 03 Bolts and seams set up a situation in which a coating pulls in opposite directions from an edge as paint dries. Layering is a preventative approach
- 04 Crews carry out industrial painting of storage tanks at refinery using rollers to avoid overspray