Congratulations and Welcome!!

EEI would like to recognize the following employees for their milestone anniversaries with the company:

10 Years: **Thomas W. Talsma**
Vice President

30 Years: **Denise M. Migliorini**
Vice President

EEI welcomes: **Christa L. Van't Hul, E.I.,** Project Engineer, to our Environmental group and **Eric J. Meschewski, P.E.**, to our Civil group!

Did You Know?

President, Peter G. Wallers, P.E., CFM and Senior Vice President, David R. Burroughs, P.E. were awarded with the Compassion Foundation's Community Champions. Selections were announced at their annual appreciation dinner on Thurs., Oct. 1st held at Two Brothers Brewery in Aurora, Illinois. To learn more about the Compassion Foundation please visit: http://compassionfoundation.org/

Enterprises Trivia Challenge

Q: When was the first elevated steel water storage tank built west of the Mississippi River?

Send your answer to **eei@eeiweb.com** or fax to **(630) 466-6701** by December 31st to be entered in a drawing for a $50 American Express gift card!

Engineering Enterprises, Inc. (EEI), founded in 1974, provides consulting engineering services throughout northern Illinois. Our expertise includes water, wastewater, transportation, stormwater, construction management, land surveying and GIS.

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Water Storage Coating Systems: Which System is Right?

In this Edition:


Elevated Water Storage Tank

Water storage tanks are a critical part of any water works system, and, like all infrastructure, on-going maintenance is required. Water storage tanks face a variety of adverse conditions that can shorten the lifespan of the tank. Weather, temperature variation, ultra violet radiation from the sun, and corrosive gasses create conditions which accelerate the deterioration of the steel tanks; so, it is important that the steel is protected. Protective coatings most commonly create a barrier between the steel and the volatile environment surrounding it. There are several different coating systems, and many wonder which is the proper coating system that should be applied on tanks within their particular water system. Many factors should be considered when making this determination, such as cost, weather conditions during the painting process, the tank location and surrounding features, and life expectancy of the coating system.

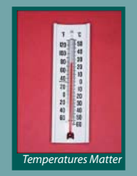
Fall / Winter 2015

Enterprises

Water Storage Coating Systems: Which System is Right?, Cont'd.

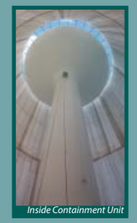
Cost is always a concern when selecting a coating system. Coating systems have a wide range of initial capital cost. When estimating initial capital costs, both labor and material costs should be reviewed. Complexity of the logo and tank color scheme can increase the cost dramatically. The labor costs to rehabilitate a tank tend to be significantly more than the material costs. Therefore, the higher quality paint system may not result in as much of an increase to a project as one may think. Cost of rehabilitating a tank is impacted by the existing conditions of the tank. Not all tanks need to be completely stripped or abrasive blasted down to bare metal. Depending on the condition and adhesion of the existing coating system, an overcoat may be appropriate. However, if a tank is anticipated to be overcoated, then the Engineer should verify with the manufacturer of the proposed coating system that the tank can be overcoated with the existing substrate/coating system. Not all paints can be overcoated with any type of coating system. Over-coating a tank does have a lower initial capital costs, but often times, the coating system may not last as long as a tank that was stripped down to bare metal and re-coated. Surface preparation is critical in ensuring a good product when coating a tank. Life cycle costs should be considered given different coating systems have different anticipated life expectancies.

Opportunity costs are another factor when selecting coating systems. Some utilities do not have the luxury of a multi-tank system, and taking the tank out of service can come at a great operational cost to the employees of the water utility. The summer months typically provide the best conditions to re-coat a tank, but this also typically corresponds with when demand on the water system is highest. This can create significant operational challenges for operators, and it is magnified when a utility does not have multiple elevated tanks. Therefore, when financially feasible, it is often recommended to utilize the coating system with the greatest life expectancy as to limit the times the tank will be taken out of service.


Temperatures Matter

Weather conditions during the painting process also can impact the coating system selection. In the Midwest, tanks painted in the early spring and late fall have to contend with more atmospheric moisture in the morning, evening, and overnight than tanks painted in the summer months. In addition to the wetter conditions, temperatures also fluctuate more. Colder temperatures require longer cure times, and some chemical reactions in the coatings require a certain temperature range to be maintained in order for the necessary reaction to take place, which causes the coating to cure. Cure time of the coatings applied in the early spring and late fall are more important than coatings applied in the summer months, and many coatings can be mixed with an additive that accelerates the cure times. Additionally, different equipment may be needed during the re-coating process such as heaters and dehumidifiers if colder or wetter weather conditions are anticipated.

The tank location and its surrounding features can also affect the coating type selection. When overspray onto a nearby property is a concern, "dry fall" coatings can be considered in lieu of a containment system in efforts to minimize cost. Containment systems can protect nearby property from overspray during the painting on the exterior of the tank, but it also adds significant cost to the project. However, containment is often unavoidable. Abrasive blast cleaning is a dusty process, and if there heavy metals such as lead or chromium in the existing paint, then more stringent containment requirements must be implemented in order to contain the hazardous materials.


Inside Containment Unit

Various coating systems provide various types of protection. Zinc enriched prime coats offer galvanic protection beyond a barrier protection. The zinc sacrifices itself to corrosion in place of the steel tank. Zinc rich primers make excellent prime coats in both the exterior and wet interiors of tanks. When the outer coating systems inevitable fall, the zinc rich coatings help to extend the life cycle of the overall coating system.

Acrylic polymer, Polyurethane, and Fluoropolymer are the most common coatings for the exterior surfaces of water storage tanks.

Acrylic polymer systems are common for over-coating tanks without a containment system. Acrylic polymers can be a "dry fall" coating, which means the tiny droplets of paint dry as they fall to the ground and do not bind to the surface they land on. Without the need to abrasive blast, the cleaning of the tank surface and the east of coating system application labor costs are typically less with this type of coating system. The life cycle of this coating is typically less than some of the other coating options available.

Polyurethane coating systems are also commonly used on the exterior surfaces of steel tanks. Polyurethane coating systems are typically three or four coats with a zinc rich primer, an epoxy intermediate coat, and then one or two Polyurethane coats. The anticipated life span of a polyurethane coating system is approximately 15 years given proper surface preparation and installation. Polyurethane coating systems are highly resistant to abrasion, cure fast, and retain a glossy finish. It is however susceptible to moisture during the curing process.

Fluoropolymer coating systems is a three coat system with a zinc rich primer, polyurethane intermediate coat, and Fluoropolymer finish coat. Fluoropolymer coating system provide excellent ultra violet radiation protection as well as resistance to abrasion. The Fluoropolymer coating system has the longest anticipated life span of 20-25 years given proper surface preparation and installation. When material costs are considered, the Fluoropolymer coating system often has the highest initial capital cost, but over the life span of the coating system it is typically less expensive than the other coating options.

Epoxy coating systems are commonly used for both wet and dry interior surfaces on the tank. The most common epoxy coating system is a three coat system with a zinc primer, epoxy intermediate coat, and epoxy top coat. This provides both galvanic protection with the zinc primer and barrier protection with the epoxy coats. Another type of epoxy used in interior surfaces is a 100% solids epoxy. This coating, or more accurately called a lining, can be applied much thicker than other coatings because it does not have solvents which must escape during the curing process. Typically, the 100% solids epoxy lining is paired with a zinc primer for a two coat system that has excellent barrier protection due to the extra thickness.

Before selecting a coating system on your next water storage tank project, we recommend consulting with an EEI Engineer. Contact **Michele Piotrowski, P.E., LEED AP, Project Manager, at (630) 466-6724 or mpiotrowski@eeiweb.com**

Article by: Michael W. Schweisthal, E.I.

President's Message

Fifty Shades of Grey and the Engineer..... now that I have your attention!

Recently I was at a meeting when another design professional remarked that he wished he was an engineer, because our issues are so black and white. He further explained that engineer's solutions are all based on science and math. That statement hit me like a ton of bricks and it consolidated two concepts that I had been thinking about.

First, while it is true there is a lot of math and science in engineering, rarely do we operate on the Black or White ends of the spectrum. I would say we operate in more gray areas than black and white for sure. Every day our practice depends on the use of engineering judgement, which goes way beyond scientific calculation. Engineering judgement is critical to the practice of engineering, and is what truly adds value to the profession. Weighing all aspects of a problem, both the tangible and intangible is the key to coming up with the right solution. So while it may seem that the practice of engineering is all math and science, it turns out there is one more facet that comes into play.

Second, it is the reason that Qualification Based Selection (QBS) for engineering services makes so much sense. Choosing an engineer based on qualifications and experience ensures that the solution identified and the finished project will be the most cost-effective and successful. The cost of engineering services on any project is a very small part of the life cycle cost. Our experience over thousands of projects has proven this out and we work hard every day to bring value to our clients and their bottom line. The older that I get the more I start to appreciate old sayings, such as "don't be penny wise and pound foolish". When you select an engineer remember it is not always Black and White.