Powering Up

Painting Stacks on the Fast Track

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Photos courtesy of Carboline Company

For millions of Americans to be able to turn on their stoves or televisions, keep a fan running to cool down during the hot summer days or charge their cell phones without a second thought, U.S. energy suppliers must consistently find ways to increase their production capabilities and efficiency.

Harnessing these forms of energy and bringing them onto the main stage for consumers requires robust processing facilities to make it all possible, which can present some of the harshest and most demanding service conditions in any industry. From solar and hydroelectric power to nuclear energy, to natural gas and oil, to wind power, there is a massive number of critical power production facilities nationwide that require not only corrosion protection measures to be used during initial construction, but also constant monitoring and maintenance in order to remain operational and reliable.

Those readers in the industrial coatings field know what that means—steel and other substrates need quality, protective coatings that can keep the structures intact and in operation over the lifetime of the plant.

This brings us to one liquefied natural gas (LNG) facility in Medway, Massachusetts, owned by a large U.S. energy provider that serves over 20 million homes with power, where a silicon acrylic protective coating was applied on the scalding exterior surface of regasification stacks in May of 2019—and reportedly maintains its fresh appearance today.

Shop-primed with zinc in advance, the 185-foot-tall stack structures were delivered from overseas and erected prior to surface preparation, spot-priming and coating application. Cranes and lifts were utilized throughout the project to apply coatings at heights exceeding 185 feet.

LNG fuel is not a new technology, having been commercially available in the U.S. since the mid-20th century, but developments in production processes have led to it being regarded today as one of the cleaner fossil fuels available. This “mainly-methane” fuel undergoes a refrigerating process and is cooled to -256 degrees F, where it liquefies and is then ready for transport. Once the LNG arrives at its destination, it needs to be returned to its gaseous state, which is where the regasification stacks come into play.

The external surfaces of these stacks need to be protected with a coating that not only has weathering properties, including ultraviolet radiation resistance, but can also resist the high surface temperatures present. These stacks maintain continuous elevated surface temperatures, which pose a problem for most of the industry’s standard generic atmospheric coatings. A scenario such as this is where silicon-hybrid coatings can prove their capabilities.

Nuts and bolts and tight angles required brush and roller application to ensure full coverage.

In this example, the Medway stacks were newly erected, with the steel having a zinc shop primer previously installed. As the delivery of the stacks from overseas to the site was behind schedule, this became a fast-track coating project. As soon as the stacks were installed, the painting portion began. Solvent Cleaning (SSPC-SP 1) was utilized in conjunction with High Pressure Water Cleaning (SSPC-SP 12/ NACE No. 5; HP WC) at 5,000 psi, as well as Hand and Power Tool Cleaning (SSPC-SP 2 and SSPC-SP 3) in order to ensure the surface was free from dirt, dust, oils, debris and other contaminants, and suitable for the subsequent protective coating. Welds and repair areas were spot-primed with organic zinc, and then the entire surface was finished with a full coat of the silicon coating at 1.5–2 mils. Typically, LNG stacks can reach heights of 150 feet and more, and the stacks involved in this project exceeded that at 185 feet in height. Hence, the possibility of getting overspray on adjacent structures even a quarter of a mile away was of major concern. To mitigate this possibility, the applicators used high-volume, low-pressure (HVLP) spray guns, and brushes and rollers on small areas such as nuts and bolts, and tight, back-to-back angles.

As straightforward as this may sound, having a boom lift at those heights can be a difficult operation—a slight breeze on the ground can feel like a gale wind up that high, sending the basket in the man lift into an oscillating cycle that would test the mettle of even the most skilled applicators as they try to spray an even coat of paint onto a vertical surface. The boom lift could not be driven to the backside of the stacks, so a crane had to be used to lift it into position to fully coat the structure.

The project was also conducted in the springtime in Massachusetts, so dew, fluctuating weather conditions and high humidity, were significant factors in getting the project finished properly and on time. As the painters (and, therefore, the paint) are often the last construction entity to enter and perform their duties on a newly built structure, and there are often at least three or four different fabricators on a site at any given time whenever the painters arrive, communication is critical so that no one is in someone else's way—otherwise, operations can get messy very quickly.

Given the atmospheric conditions, logistical challenges and high-heat service, finding a coating that can operate under those conditions and maintain its application flexibility, be applied in the field, and that works well, is not easy. Silicon coatings and inert polymeric matrixes can be suitable for high heat service but need to be fully heat-cured before being used in atmospheric service. That's why silicon acrylic can be used as a potential workhorse in these types of services, where the service temperature may not be as high as to require silicon or inorganic coating, but above the range of normal epoxy, acrylic and urethane thresholds. The hybrid technology allows them to be applied in the field with weathering properties and fast dry-to-touch and fast recoat times.

After two years of continuous scalding temperatures and Mother Nature's wear and tear, the stacks today look like they were painted yesterday—the results of diligent application and the selection of the right coating for the job.

The coating on the finished stacks is designed to protect the steel at service temperatures of up to 500 F.

ABOUT THE AUTHORS

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