Coating Products Extend Cooling-Pump Life at Power Plant

Brackish water does a number on metal. As it circulates through massive cooling pumps at the Brandon Shores Power Plant near Baltimore, MD, it erodes the cast-iron casings, impeller blades and other parts. Jeff Jensen is an engineering technician at the coal-powered facility, which is located on the Patapsco River and owned by Constellation Power Source Generation (formerly Baltimore Gas and Electric). He conducts a never-ending war on wear and corrosion. To contain maintenance costs, Jensen is always on the lookout for products and techniques that will prolong equipment life.

"We want to maximize the life expectancy of these pumps," says Jensen, "and we don't want to have to open them up every scheduled outage."

When recent routine flow tests at the facility indicated a problem with Pump 12, Jensen had to shut it down and look inside. However, thanks to abrasion-resistant coatings manufactured by Devcon, a Massachusetts-based company that manufactures maintenance, repair, and overhaul products for industry, Jensen was pleasantly surprised. Despite deterioration in certain areas, the coating had held up well. After four years of service, Jensen saw far less pitting and rust than he had seen on other pumps of this kind.

Pump 12 is one of four identical Foster Wheeler DS-1 single-stage, double-suction, split-casing, horizontal, centrifugal pumps that each weigh more than 40 tons and circulate 126,000 gal. of water per minute. Four years earlier, Jensen's maintenance crew had coated the pump casing's inner walls with Devcon Sprayable Ceramic, a two-coat, corrosion-resistant epoxy compound that produces a smooth, long-lasting, protective finish. Although the years of operation had worn some of the casing's lining down to the red primary coat, and down to bare metal in others, most of the casing was blue, indicating that both layers of the coating system were intact.

"I was pleased to see that we didn't have to blast the entire casing," says Jensen. "Much of the expense of refurbishing a pump like this is a result of the time it takes to blast, clean and prime the areas to be coated."

Before beginning repairs, Jensen called for an adhesion test on several sections of the coating where both layers were still intact. The crew turned the handle of an elcometer adhesion device until it indicated 1,000 lbs. per sq. in. The coating would have withstood even higher delaminating forces; it was still holding fast when the crew, convinced of the coating's adhesion, ended the test. Based on this proof of the coating's durability, Jensen decided to recoat Pump 12 with Sprayable Ceramic.

"This product has outperformed all the other coatings we've tried for these water pumps," says Jensen. "It performs well under extreme conditions, and applying it doesn't require much training. It saves us money, so we stick with it."

Where the lining was partially or fully worn away, the crew used abrasive and high-pressure water blasting to prepare the surface for better adhesion. After blasting, bare-metal areas were primed. The crew then rolled and brushed on the red first coat of Sprayable Ceramic to a thickness of 12-15 mils. The next day, they coated the entire casing with a blue, second coat of Sprayable Ceramic. This was also

applied to the parts that still had both layers intact.
Jensen decided not to rebuild the pump's pitted impeller. Instead, he replaced the 17-year-old bronze/aluminum unit with a new stainless steel impeller. Convinced of the effectiveness of Sprayable Ceramic on the pump casing, he had the crew blast the new impeller with aluminum oxide to achieve a 2- to 3-mil profile. They then coated it with two coats of Sprayable Ceramic.
"We wanted to avoid the possibility of a galvanic corrosion cell between the cast iron casing and the stainless steel impeller and sleeves," he says. "If such a cell were to occur, it could cause a rapid deterioration of the casing."
After blasting the casing's eroded wear-ring channels, the crew coated the area with Devcon FL-10 Primer to prevent flash rusting, then coated the wear rings with Devcon Liquid Release Agent (to keep material from sticking to them). After positioning the rings, the crew rebuilt the grooves with Devcon Titanium Putty, a titanium-reinforced epoxy compound with high compressive strength (to 18,800 psi), temperature resistance (to 350 degrees F), and resistance to chemical and acid corrosion. The actual wear rings were used as a form to recreate the grooves.
Jensen anticipates a time when he'll be able to coat these circulating water pumps, put them back into service, and not have to worry about them for eight to 12 years. Until then, he says, he'll continue to wage war against corrosion and wear, maximizing the plant's equipment life and minimizing labor costs with his arsenal of coating products.
Devcon

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