Although tightening environmental regulations have fueled advancements in coal-fired generating technologies and emissions control equipment, belt conveyor systems used to move the fossil fuel from bunker to burner operate basically the same today as they have for decades. Keeping these systems running at optimum safety and efficiency requires regular monitoring of idlers, bearings, drives, pulleys and belting that operate over long periods of time in a dusty, constantly vibrating environment under a wide range of temperatures.

Manual inspections, sometimes described as “walking the belts,” are one way to identify potential problems that can reduce conveyor performance, or even cause a system breakdown. Conditions such as overheated components, overloading, belt slippage, loss of synchronization between conveyors and sharp pieces of tramp iron or other material wedged into the conveyor can damage a belt. The accumulation of coal dust on and under conveyor equipment is another concern for power plant personnel given its risk of ignition, especially where Powder River Basin (PRB) coal is burned. From 1984 to 2004, 23 coal dust explosions at U.S. power plants killed 16 and injured 95 people, according to industry statistics.

Coal combustion results in the release of sulfur dioxide ($\text{SO}_2$), nitrogen oxides ($\text{NO}_x$), mercury (Hg) and particulate matter (PM) that contribute to the corrosion of metal surfaces and conveyor components. “Due to the high sulfur content in coal dust, when it mixes with moisture and high humidity you end up with a mild sulfuric acid solution,” according to Tnemec coating consultant Dan Anderson. “That’s one of the chemicals a protective coating system is designed to protect against.”

Anderson cited the example of the 650 megawatt William Station power plant which burns approximately 230 tons of coal per hour when operating at full load. In the 1980s, the plant’s owner, South Carolina Electric and Gas, initiated a program to extend the service life of industrial coatings used to protect its coal conveyors and stacker/recycler. Two coating systems were specified representing thousands of gallons applied over a several year period to structural steel supporting the conveyors.

Structural steel on the conveyors was primed with Series 530 Omnithane, a moisture-cured, aromatic urethane for marginally prepared steel that provides excellent resistance to abrasion, moisture, chemicals and corrosion. An intermediate coat of Series 27 F.C. Typoxy, a polyamide epoxy, was used as a tie-coat under Series 73 Endura-Shield, an aliphatic acrylic polyurethane.

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An alternate coating system used on new equipment consisted of Series 90-97 Tneme-Zinc, an advanced technology, moisture-cured, zinc-rich aromatic urethane primer that was shop-applied. Series 113 H.B. Tneme-Tufcoat, a waterborne acrylic epoxy, was field-applied as an intermediate coat, followed by a topcoat of Series 30 Spra-Saf EN, an acrylic polymer with long-term corrosion protection and weathering properties. The dry-fall characteristics of Spra-Saf EN help reduce the potential of overspray on surrounding equipment.

Both coating systems were selected for their resistance to the corrosive humid and saltwater environment of the plant’s location near Charleston, South Carolina, as well as chemical attack from sulfur dust and abrasion from coal. “The top portion of the conveyors have a galvanized cover to protect the conveyor belt, but inside the conveyor is open to the elements,” Anderson noted.

After more than 20 years, a visual inspection revealed very little corrosion, only slight fading of the coating finish and minimal maintenance related to the condition of the coated steel. Based on their proven performance, Tnemec coating systems continue to be specified at coal-fired power plants across the country. “Right now, we’re in the middle of specifying coating systems for 20 conveyors at six different plants,” Anderson added. “Some of the conveyors are 300 to 400 yards long.”

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