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PUMPS & SYSTEMS

Progressive Cavity Pumps Solve Magnesium Hydroxide Problems

Smart conveying technology improves uptime at a coal-fired power plant.

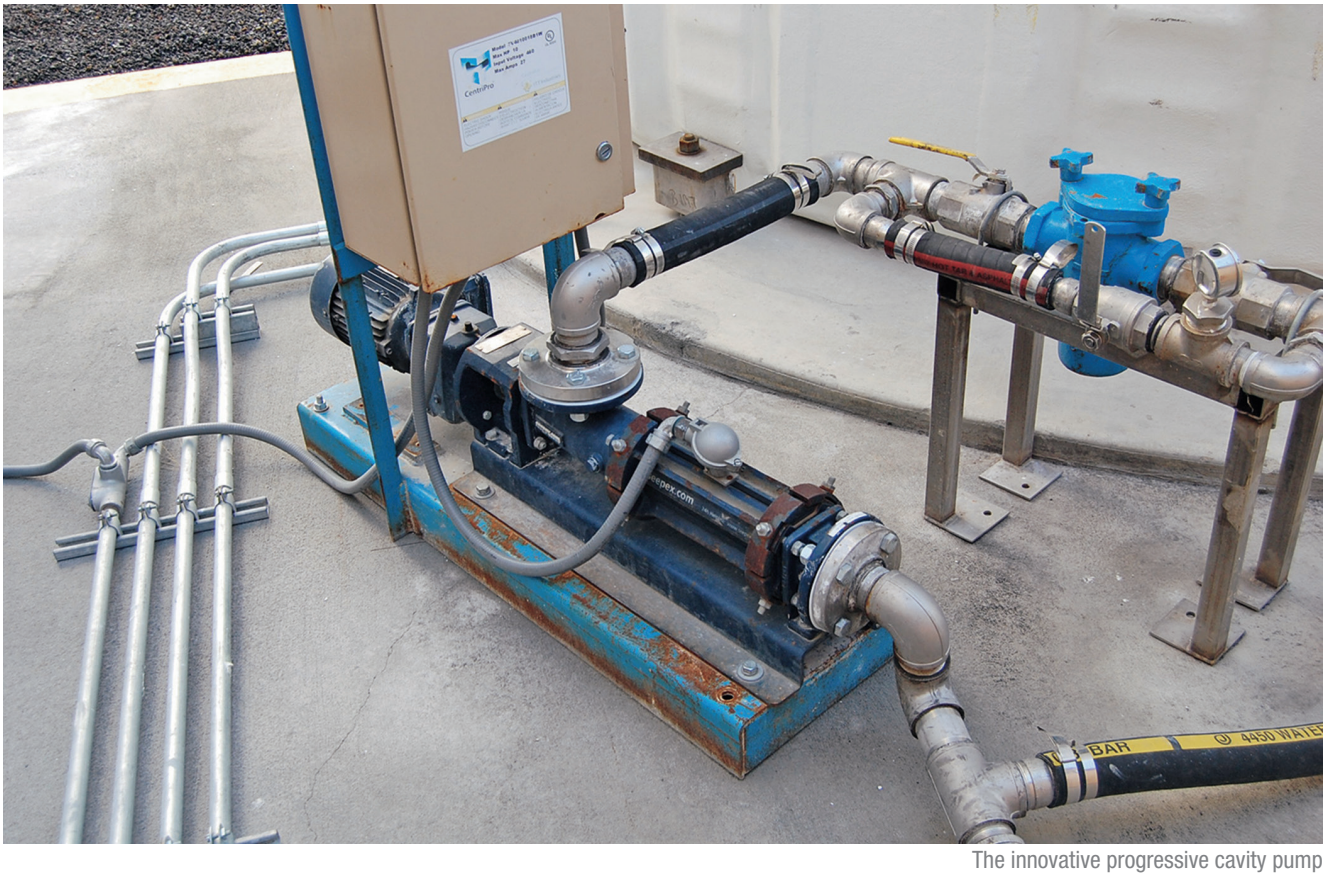
By Kathryn Ranger, seepex, Inc.

Fuel Tech, Inc., is a technology company engaged in the development, commercialization and application of proprietary technologies for air pollution control, process optimization and advanced engineering services. These technologies enable customers to produce energy and processed materials in a cost-effective and environmentally sustainable manner.

THE PROBLEM

At a power plant site in the U.S., Fuel Tech was cost-effectively and safely reducing slag buildup in multiple coal-fired power plant boilers through the use of a proprietary chemical injection process. One chemical used in this process is magnesium hydroxide. Magnesium hydroxide is an inorganic compound that presents no hazard to the environment because of its mild reactive pH and solubility. It is a safe alternative to harsh chemicals with a relatively low environmental impact. In this installation, Fuel Tech experienced difficulties with the pumps that transferred the magnesium hydroxide because of its thick and chalky properties.

Fuel Tech had difficulty finding a reliable pump and tested several types with little success. While many pump manufacturers claimed that their pumps could handle the magnesium hydroxide slurry, most could only do so in a limited manner and pump maintenance became an ongoing issue. The magnesium hydroxide slurry being pumped in this application was made up of 50 to 60 percent solids and could be difficult to store and convey. Fuel Tech's vast



The innovative progressive cavity pump

experience with this product led to an onsite engineering design that addresses all aspects of the difficulties of working with magnesium hydroxide, and a reliable, low-maintenance pump was critical to the design. Hose pump life expectancies were short, and they failed to handle the thixotropic liquid.

Chalky residue leaked into the internal components due to tube and inner roller failures causing contamination—a time-consuming mess to clean up and repair. Centrifugal pumps were decidedly unsuitable because the abrasive chemical quickly wore down the mechanical seals, costing the plant up to $1,500 in repairs, which occurred every 3 to 12 months. Air-operated diaphragm pumps used expensive compressed air, and the reciprocating action caused check valve wear that required frequent check valve replacement. In outdoor applications during the winter months, despite an attempt to dry the air, the air valves would freeze up, and this could cause hosing and piping to burst spilling significant product in the properly designed containment areas which caused housekeeping issues and cleanup expenses.

THE SOLUTION

In the end, a range of progressive cavity pumps with smart conveying technology proved to be the most effective, reliable and economical solution, while providing the easiest maintenance and longest service.

They could handle temperatures between 32 F and 113 F, pressures up to 60 psi, and a flow rate between 7 and 14 gallons per minute (gpm). Offering controlled flow with minimal pulsation, this pump conveyed the magnesium hydroxide slurry gently from one tank to the next without leakage, freezing or suffering excessive wear.

Fuel Tech Operations Manager Dwayne Gooch described the normal wear and tear of this pump as easily and quickly repaired thanks to the innovative technology.

"The smart conveying technology of the pumps provides service technicians with simple access to the rotor and stator for inspection without the need to dismantle pipelines," Gooch said. "The removal of foreign material or blockages is resolved in a fraction of the time spent servicing the prior pump types, reducing maintenance time by 80 percent. The stator is split axially into two halves, which are compression fit together using four retaining segments. Those segments also act as re-tensioning devices that, when tightened down, can help regain optimal flow rates. The life-cycle costs of the pump in operation have been reduced thanks to less downtime, fewer service hours and fewer spare parts. The plant's energy consumption has declined. Compared to centrifugal pumps, which require 10-horsepower motors, and hose pumps, which require 7.5-horsepower motors, the pump is able to run using a 2-horsepower motor."

Before the innovative progressive cavity pumps, Fuel Tech's real expenses were in downtime and messy repairs. Maintenance issues on the centrifugal, hose and air reciprocating pumps exhausted 70 to 100 man-hours per year until the progressive cavity pumps with the new technology were installed. Now the plant experiences practically zero downtime. The facility currently has three progressive cavity pumps in operation and plans to purchase two additional ones. One of the pumps has been in use for two years and has yet to show any signs of wear and has not required any service. **P&S**

The components of the smart conveying technology were developed to speed up rotor and stator maintenance times and improve the ability to remove blockages and contaminants.

Kathryn Ranger is the marketing administrative assistant for seepex, Inc. and is currently in pursuit of a degree in Business Management with marketing option. She can be reached at kranger@seepex.net or 937-864-7150. For more information about seepex's Smart Conveying Technology and progressive cavity pumps, visit www.seepex.com.