



**TECHNICAL
ARTICLE
SERIES**

Thermoplastic Pumps Take the Heat off Utility

ARTICLE # TL-122

INDUSTRY: Power, Energy and Utility

ENTITY: Entergy Corp.

SOLUTION(S) PUMPED: Caustics, Sodium hydroxide, Sulfuric acid

PUMP TYPE(S): SUMP-GARD Thermoplastic Vertical Pump

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Thermoplastic pumps take the heat off utility

Reprinted from INDUSTRIAL MAINTENANCE & PLANT OPERATION

Caustics and acids no longer cause maintenance shutdowns

Entergy Corp. is a large investor-owned utility headquartered in New Orleans and serving customers in Arkansas, Mississippi, Louisiana, and Texas. As part of a cost-reduction and profitability program, management began a planned program of reducing maintenance costs through equipment upgrades.

A big part of the upgrade program is an attempt to reduce corrosion problems and boiler downtime associated with pumping acids and caustics needed for water purification.

At the company's Michoud Power Plant in New Orleans, water bills average \$6,000 a month. Boiler water consumes 100,000 gal. a day, and another 25,000 gal. per day are needed for cooling, sealing, and regenerating and rinsing resins. A demineralization system is used to remove dissolved solids that remain in treated water.

Entergy uses sophisticated ion exchangers in the demineralization system because water flowing into the once-through boilers must be extremely pure. Removal of dissolved solids from the water prevents corrosion and scale problems.

The ion exchange purification process is complicated, but one of the keys to the process involves regenerating a resin bed that strips mineral ions from effluent water and replaces them with hydrogen. This is accomplished by using concentrated chemical solutions, which remove the depleted ions from the resin bed and replace them with hydrogen and hydroxyl ions.

Pump performance is critical to this operation. Handling various concentrations of sulfuric acid and sodium hydroxide create contamination and corrosion problems, which resulted in high pump maintenance costs and excessive downtime. As part of the corporate cost-saving initiative, the maintenance reviewed alternate chemical pump designs.

The review prompted John Erwin, maintenance superintendent, to test a vertical centrifugal thermoplastic pump on the caustic system. Erwin chose the Sump-Gard® pump from Vanton Pump and Equipment.

The pump was required to deliver 20 gpm of 50% caustic at 108°F against a 46-ft. total dynamic head. To handle this task, the Sump-Gard's casing, flanges, impeller, vertical column and coverplate are made of homogenous virgin polypropylene. Even the pump's 96-in. vertical shaft is isolated from the solution by a thick polypropylene sleeve, and a special shaft seal protects the bearing and motor from corrosive fumes.

Results of the test were excellent, and a similar pump was installed on the acid tank. To handle the H₂SO₄ however, the material specified for



The Michoud plant demineralization installation uses six Vanton vertical sump pumps. Here, three acid pumps made of Kynar PVDF are handling ambient H₂SO₄ at 20 gpm against a 55-ft. tdh. The maintenance department replaced metal pumps that experienced chronic downtime due to corrosion.



Close-up of Vanton PVDF Sump Pump showing the epoxy painted metal motor mount and plastic protective coupling guard.



Each of these three Vanton Polypropylene pumps delivers 20 GPM of 50% caustic at 108°F against a 46-ft. total dynamic head.



The sulfuric acid and sodium hydroxide required for the ion exchange purification process is stored in these large tanks outside the processing building. Note the concrete containment vault to catch any spillage.

the wetted end and the shaft seal was Kynar® PVDF. This pump was required to deliver 20 gpm of acid at ambient temperatures against a 55-ft. total dynamic head.

Because of the performance and service records of the two initial pumps, John Erwin decided to replace all six metal pumps with thermoplastic pumps manufactured to the same design specs as the test units. In this case, Entergy's upgrade program paid off handsomely.