



APPLICATION NOTE

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This application note provides an overview of the successful use of magnetically coupled gear pumps in the metering of chemicals in the demineralization of water in an aluminum smelting process.

THE INDUSTRY

One of the largest European alumina producers and refineries requires the accurate metering of sulphuric acid and sodium hydroxide (caustic soda) used in the washing of ion exchange media in their demineralization plant. Pure alumina is extracted from Bauxites and processed to create aluminum using the Bayer process. Historically, the Bayer process involved energy-intensive processes that consumed large amounts of fuel oil and energy. Modern technology allows for the company to incorporate a more energy saving process using a 150-megawatt, gas-fired, onsite Combined Heat and Power (CHP) plant to generate steam and energy for the refinery, resulting in a significant reduction of carbon dioxide emissions over the tradition of energy generated via liquid fuel. Surplus energy from the CHP plant is provided to the local electric grid.

THE APPLICATION

Demineralized water is used to produce steam for the CHP Plant. Gear pumps are used to handle the large volume feed rates of the acid/alkali shock washing and regeneration in the large ion exchange water demineralization process. Caustic pumps are controlled purely on timed doses. Acid pumps are both speed controlled via an inverter controller and time controlled for the differing sizes of ion exchange vessels. Metering is based upon pH level monitoring.

THE PUMP SOLUTION

Liquiflo Series 311 and Series 37 magnetically coupled gear pumps are used to meter sulphuric acid and sodium hydroxide at required flow rates. Metering of the acid/alkali wash is critical to both the polishing abilities of the water purification plant and the longevity of the ion exchange media. The magnetically coupled seal-less gear pumps are direct coupled to three-phase inverter rated A/C motors.

FEATURE	ADVANTAGE	BENEFIT
External gear pump design	<ul style="list-style-type: none"> • Smooth, pulse-free flow • Simple to service and maintain • Accurate, pulse-less output 	<ul style="list-style-type: none"> • Easy to monitor, easy to control • Reduced downtime and less production lost • Consistent application of ion exchange media
Magnetic coupling	<ul style="list-style-type: none"> • Containment of the pumped fluid • No rotating seals to fail • Leak free pumping 	<ul style="list-style-type: none"> • Reduced chemical and environmental hazards - no leakage in the plant • Extended pump operation between servicing means reduced downtime • No cross contamination of the pumped fluid
Inverter controlled AC motors	<ul style="list-style-type: none"> • Motor output speed can be easily adjusted 	<ul style="list-style-type: none"> • Volume feed rates can be adjusted automatically
Pump and magnet coupling heating jackets	<ul style="list-style-type: none"> • Temperature of pumped fluid is constant 	<ul style="list-style-type: none"> • Risk of pumped fluid freezing or becoming more viscous is removed