

Flow measurement for aluminium slurry

Industry: Mining
Product: magnetic flowmeter, ADMAG Series

Introduction

The slurry measurement is one of the most challenging application for magmeter. In this paper, Yokogawa's solution and expected benefit in aluminum slurry applications will be introduced.

Expected benefits

- Stable and reliable process control in noisy and slurry applications maximize the productivity.
- Longer life-time by robust design
- Minimal downtime and maintenance work.

Application

- In aluminum refinery plant, there are many tough applications to measure aluminum slurry, and corrosive chemicals.
- Stable and accurate measurement in these severe processes condition and harsh environments is the key to optimize the process control and the performance of plant operation.

Challenges

- Abrasive aluminum slurry causes the output fluctuation and damage the liner and electrodes.
- Heavy slurry noise may affect on the measurement accuracy and stability.
- Shorter replacement cycle because of the mechanical damage caused by slurry.
- High density red-mud covered on the electrodes requires frequent maintenance for the cleaning.



Yokogawa's Solution

ADMAG magnetic flowmeter series delivers fit-for-purpose solutions for the difficult applications in mining industry.

Application	challenges	Yokogawa's solution
Abrasive Slurry	-Liner abrasion -Slurry noise	ADMAG AXF -Dual frequency excitation (Enhanced dual frequency(<=200mm)) -Ceramic Liner (<=200mm) -PFA liner with metal hat(>200mm)
High consistency adhesive slurry fluids	Liner and electrodes are insulated by adhesion	ADMAG CA (<=200mm)



ADMAG AXF Solutions

ADMAG AXF's dual frequency excitation has the advantages of both the high and low frequency meters. Dual frequency excitation provides, good zero stability, accuracy of 0.35%, 0.2% as option of reading and immunity to slurry noise. Further, the "Enhanced Dual Frequency Excitation Method" is optionally introduced in the ADMAG AXF to cope with more difficult application such as high concentration slurry measurement.

AXF's new Enhanced Dual Frequency option provides an even higher excitation frequency of 165Hz for maximum slurry noise reduction when needed, without sacrificing zero stability.

Non-retained liners (extruded liner), which are commonly used in conventional meters, are susceptible to failures as a result of vacuum conditions that can be created due to a pump or valve failure. In addition, meters that have extruded liners generally have a shorter life due to the aggressiveness of the chemicals used. Yokogawa uses an injected molded PFA liner with a retaining grid. This retaining grid plate, used to reinforce the PFA liner, acts like rebar in concrete. This rugged construction holds the liner in place and prevents the liner from caving in due to vacuum conditions. The thickness and durability of the injection molded PFA liner provides a flow tube that is capable of handling the most severe applications.

The ADMAG AXF magnetic flowmeter introduced fluid adhesion level diagnosis which always monitors the level of insulating material buildup on the electrodes, which enables maintenance timing can be recognized. In addition, with the utilization of ADMAG AXF's replaceable electrode type flowtube, electrodes can easily be removed and cleaned without removing flowtube from piping.

<p>Conventional Electrode</p> <ul style="list-style-type: none"> • Exposed electrode seal • Extruded liner • UN-Retained liner • Aluminum body 		<p>ADMAG AXF</p> <ul style="list-style-type: none"> • Superior electrode seal • Injection molded PFA • Mechanically retained liner • Welded stainless steel body
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ADMAG CA capacitance type magnetic flowmeter with mirror finished liner

In red mud application, pregnant Liquor(caustic base) which quickly forms a thin hard insulating layer on the pipe walls. This coating can not be removed in-line by either chemical or mechanical means. Hence the conventional electrode type magnetic flowmeter would stop the operation once coated, because the meter to be removed and the coating was manually scarpred from the walls. As the actual example of an aluminum plant, the maintenance period that conventional electrode Type magnetic flowmeter needed in every 2-3 months could be extended to every 12-18 months with electrode-less ADMAG CA that can continue the operation even once coated. The build-up rate of red mud was well known by customer. And the reduction in flow area can be calculated in the DCS and used to correct the measured flowrate as indicated in the below picture.

