Micro Motion® Coriolis Meters Help Optimize Alumina Extraction Process

RESULTS

- The maximum amount of alumina is extracted from bauxite
- Eliminated downtime due to autoprecipitation
- On-line control reduced costs by minimizing the amount of caustic soda used

APPLICATION

Bauxite is the world's primary source of alumina, which is used in the manufacture of metallic aluminum. Alumina is extracted from bauxite using a method called the Bayer process. The Bayer process includes a number of phases, and profitable leeching of alumina from bauxite requires careful control over each phase. Operators must measure the concentration of spent liquors and use this data to charge digesters in the process. Undercharging the digesters will not produce a profitable amount of alumina. Overcharged digesters will cause autoprecipitation, which clogs the lines stops the process for maintenance.

Liquor concentrations are typically expressed as an alumina-to-caustic soda (A/C) weight ratio. If the A/C ratio falls below 0.600, target material has been lost. If the A/C rises above 0.700, autoprecipitation will occur.

CHALLENGE

Successful digester control requires the measurement of liquor density. Traditionally this measurement has been obtained with laboratory analysis of samples. However, if the process changes between analyses, the operator can make incorrect adjustments to the Bayer process.

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Micro Motion®

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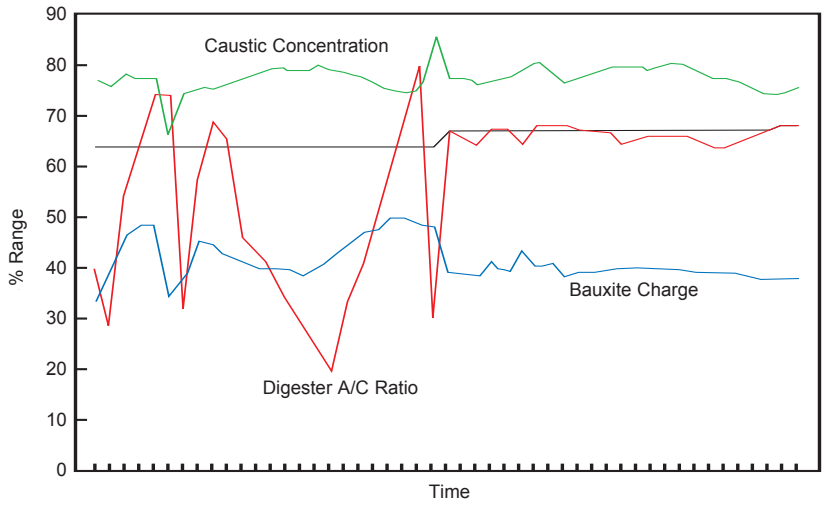
EMERSON™
Process Management

SOLUTION

Continental Controls, Inc. decided to use a Micro Motion® Coriolis meter to obtain an on-line density measurement. This data allowed Continental to devise a linear, multivariable model for control of the Bayer process, based on fluid density, conductivity, and temperature. Because density significantly affects alumina and caustic soda concentrations, the density measurement was especially important.

The Micro Motion Coriolis meter provided ±0.0005 SGU accuracy – more than sufficient to drive the equations describing the A/C ratio, and far more precise, timely, and cost-effective than the readings obtained with laboratory analysis. The figure below shows control performance before and after the introduction of the Micro Motion Coriolis meter. The left side of the graph shows the wide variation in target ratio Continental was achieving with their traditional system. The right side of the graph shows the drastic improvement realized with the Micro Motion meter.

The improved control over the Bayer process helped Continental maximize the amount of alumina they could extract from raw bauxite, while reducing caustic soda usage.



Variation in target ratio.