

Close cooperation brings results

Endress+Hauser and Boliden Kokkola developed density measurement to the highest level



Boliden Kokkola is the second largest zinc factory in Europe. The company's selection includes a total of about 40 different zinc products, some of which are pure zinc and some alloy products tailored to the needs of customer groups or individual customers. Thanks to the continuous development work, Boliden is at the top of the industry in the world both in terms of low emissions and energy efficiency.

New technology was needed for the sludge density measurement of Boliden Kokkola's zinc plant. In the development cooperation, the expertise of Endress+Hauser and Boliden experts as well as the Thesis worker's skills were utilized.

Boliden Kokkola Oy is the second largest zinc plant in Europe, which produces almost 300,000 tons of zinc a year for the needs of the automotive and construction industries, for example. In the refining process, the zinc concentrate is roasted to heat it up to nearly a thousand degrees and treated with a sulfuric acid solution to remove substances that are extraneous for zinc production.

"The iron in the solution is precipitated and removed from the process as jarosite or, in other words, iron precipitate. This is an important part of the process, so that the end result is a pure zinc sulfate solution," says Boliden Kokkola's Development Engineer **Jussi Ruokanen**.

Boliden Kokkola wanted to develop its own processes and improve density measurement in the jarosite supply tank, from which the sludge

containing iron precipitate is directed to filtration. Balancing the density in the tank also balances the strength of the solids layer on the six belt filters.

"The aim is to use density measurements in daily process operation so that the solution coming from the belt filters has been filtered as effectively as possible to contain the desirable components such as water-soluble zinc, which should conversely be minimized in the outgoing jarosite precipitate," says Boliden Kokkola's Automation Specialist **Matti Karjula**, who ran the development project.

Boliden began the cooperation with an open mind. That said, it did have one clear wish in mind.

"Customer did not want radiometric measurement for this purpose. These days, many facilities work to get rid of it since, as a radiation source, it requires special documentation and safety measures. The new solution provides Boliden Kokkola with savings and peace of mind in this regard, too – not to mention how much precise and reliable measurement facilitates process control," describes **Elisa Patrikainen**, Endress+Hauser's

Industry Manager for Mining, Metals and Chemicals.

Thesis work supports the choice of equipment

Ultimately, a decision was made to implement the measurement with Endress+Hauser's vibrating level switch and density calculator. A mass pipe was also considered as an option, but there have been challenges with their reliability in measuring precipitating and surface-covering solutions that contain solids.

"Endress+Hauser had good references with corresponding measurement positions and systems in Finland and abroad. Based on them, we suggested a solution which fortunately also convinced the customer," says Endress+Hauser's Manager for Northern Finland **Kari Isometsä**, who has years of experience in the mining and metal industries.

Important data to support the choice of equipment was gained from the thesis of process, material and chemical technology engineer **Noora Alapiha** in which she examined the functioning of the density measurement. Alapiha was already familiar with Boliden as a work environment thanks to previous summers spent working at the treatment plant.

"In my thesis, I used comparative measurements to analyze the functioning of the sludge density measurement and cake thickness measurement on the jarosite belt filter. The aim was to find a way to facilitate the day-to-day process operation," Alapiha says, summarizing her thesis.

"As the density varies, it is difficult to monitor it reliably. Noora's thesis and the sludge density control circuit that was built in connection to it were

essential to improve the reliability of measurement and, by extension, the efficiency of the entire process," says Ruokanen, who served as an instructor for Alapiha's thesis.

The development cooperation was worth the effort

Ideally, cooperation leads to results and benefits that stand the test of time. Both Boliden and Endress+Hauser are now extremely pleased with how the right measurement technology enables clear savings in the treatment process.

"The precise density measurement enables optimizing the capacity of the sludge to be treated and the amount of chemicals needed for the reaction. This, in turn, guarantees a better treatment result, which ensures cleaner process waste and more recovered zinc," Karjula explains.

"Compared to the monetary benefit to be gained over the years, the investment that customer made now was small," Isometsä adds.

The development project was not the first of its kind for Boliden Kokkola, since the company, which operates in Sweden, Norway and Ireland in addition to Finland, invests heavily in development work. All those involved in the development project feel that the projects provide positive challenges and are worth the effort.

"The development work and all of its phases from planning to follow-up take time. We strive to make bold yet justified and well-prepared changes. Through extensive testing and repetition, we ensured that in this case, too, the final solution yields high-quality measurement data," Karjula describes.

"Knowledge, professional expertise and experience can only take

development so far. As measurement technology develops, customers also need to have the courage to let go of the familiar and try out new solutions," Isometsä says as a reminder.

It all comes down to partnership

In addition to the successful end result, the parties heap praise on the smooth and close cooperation. The project strengthened the years-long partnership between Endress+Hauser and Boliden Kokkola even further.

The cooperation with sludge density measurement continues: a new supply tank has already been ordered and the device that was found effective this time was selected for it, but with a longer sensor. In fact, there is a wealth of opportunities for developing measurement: currently, the measurement is purely informative, but its adjustability and the need for automatic treatment are being explored.

Patrikainen sees many potential applications for corresponding measurement technology, regardless of the field of industry.

"We can measure practically any solution and its density, as long as the possible variations in density are appropriately considered, as was the case in Noora's thesis. The condition may also require the sensor to feature a specific material or coating, and our portfolio has plenty of options. This measurement method can truly be a feasible alternative for positions where radiometric density measurement has been used before," Patrikainen says, marketing the new solution.

"Thanks to the results and Patrikainen's sales pitch, the measurement solution might just find its way to other positions at Boliden," Ruokanen laughs.

www.fi.endress.com