Outotec® Pretium Calciner Optimizer – Integrating Process Know-How into Daily Operations

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Abstract

As a key technology provider in the field of fluidized bed technologies, Outotec has successfully implemented digital systems in fluidized bed processing facilities in different locations worldwide. Simulation models including process know-how are transferred to the digital world and available to operators around the clock. The presented work describes the implementation of simulation models in an integrated digital system: the Outotec Pretium Calciner Optimizer. For a plant design and engineering company with decades of experience in the field of alumina calcination technology, one of the current challenges is to find ways to digitize valuable know-how and then take advantage of it in order to optimize industrial processes in terms of energy and resource efficiency. In this paper we present Outotec's approach to combining process expert know-how, detailed simulation models, and operational experience with the goal of improving customer plant operation. Using our digitalization approach, the required know-how can be made available to ensure optimum plant operation 24/7. Recent success stories demonstrate improvements in production rates on an industrial scale, reductions in utilities consumption, as well as improved emissions control to ensure compliance with environmental standards. The results should motivate the industry to follow the digital transition in ore processing even further in order to achieve even greater benefits.

Keywords: Alumina calcination technology, simulation models, digitalization know-how, operational experience, Outotec Pretium Calciner Optimizer.

1. Introduction – Digital Trends in Process Industries

The mining and process industry is currently seeing a strong trend towards increasing digitalization. Global players throughout the value chain are investing in digital solutions in order to optimize the mining and production process. Mining equipment is increasingly being fully automated and connected to downstream process steps with the goal of achieving optimization across the entire product value chain.

As a manufacturer of process plants and equipment, Outotec has identified similar needs in customer plant operations, leading to the following main drivers for digitalization, which can be observed in the alumina production sector:

- **Investment risk avoidance**: Customers tend to avoid high CAPEX investments in new plants. Instead, they focus on optimizing the operation of existing equipment or seek to achieve selected process improvements that have maximum impact on plant performance.

- **Productivity challenge**: With existing equipment, OPEX is increasingly the dominating factor in terms of a production facility's profit. Improving operational excellence can also lead to increased production with existing equipment, thus maximizing profits without high investment costs.
- **Shortage of skilled labor**: Many productions sites are in remote locations, making them an unattractive workplace for operating personnel. Thus, a more autonomous operation with an improved level of equipment monitoring can maximize availability for a production site.
- **Sustainability**: With environmental regulations becoming increasingly strict in most countries around the world, operators face the challenge of reducing their emissions in order to avoid financial penalties. Furthermore, reducing energy consumption has a direct impact on OPEX.
- **Declining ore grades**: It is generally accepted that many of earth's high-grade ores have been completely depleted. The decline in ore grades means that operators face even greater challenges.
- **Technology push**: Digitalization allows information to be made available in real time, practically anywhere in the world. A digital process plant allows managers to monitor production figures from anywhere and at any time, providing a solid basis for improved decision-making.

The challenges listed above act as strong drivers for the adoption of digital technologies. These topics can be a focus for digital technology investments for production plants in general, not only in the field of alumina calcination. Given these facts, in the future digitalization will have a key role in overcoming productivity challenges, helping to improve both the level of automation and the monitoring of process plant and process equipment, as well as helping to ensure compliance with environmental regulations. Digital technologies will be able to provide operating personal with round-the-clock assistance, thereby making the processing of lower-grade ores easier. Finally, the digitalization of process plants can be achieved for a relatively low investment cost and with manageable investment risk.

The following sections describe Outotec's approach to helping customers address these challenges in the context of an alumina calcination plant. However, the general approach is transferable and currently being applied to other process technologies. The integration of Outotec know-how into digital systems, both on the plant scale and the equipment scale, is described in chapter two. The implementation of the Outotec Pretium Calciner Optimizer in customer sites is described in chapter three. An example of a successfully executed project implementation for a digital system in fluid bed operation is presented in section four. Finally, chapter five presents a summary of the paper.

2. Digitalization of Process Know-How

The motivation and drivers for digitalization in the context of alumina calcination technology and the process industry in general give rise to the question "What does digitalization mean?". As a plant manufacturing company with more than five decades of experience in the design, construction, commissioning, and operation of calcination plants, Outotec has accumulated comprehensive know-how on all aspects of this technology. This knowledge serves as basis for potential operational improvements; however, the global distribution of production facilities makes it challenging to utilize this knowledge base to improve daily plant operation. Put simply, it is not possible to provide local face-to-face support at customer sites at all times.

Digitalization offers a solution to these challenges as it enables technological process and detailed equipment know-how to be made available around the clock anywhere in the world.

Outotec is currently rolling out digital systems for various processes, including alumina calcination plants and iron ore pellet plants. Results are expected to be in the same range as measured using the Outotec Pretium Roaster Optimizer. Analyses show high potential for energy consumption optimization with both technologies. Results are expected within the next year.

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