JKTech
Technical Article

Getting the most from existing processes – using cleverly designed experiments to find ways of mitigating the need for capital expenditure.

Paper in Brief

Getting the most from existing processes – using cleverly designed experiments to find ways of mitigating the need for capital expenditure.

This is a technical article based on work undertaken by Boyne Smelters Limited (BSL) and JKTech to identify strategies to improve the performance of BSL's dry, fixed-speed autogenous grinding (AG) mill.

For further information contact:

Dr Timothy Vizcarra, Process Specialist

t.vizcarra@jktech.com.au

Getting the most from existing processes

The complexity of mineral processing operations can make it difficult to identify the best combination of process set-points that maximise the performance of a unit or process. Furthermore, variability in processing data can further complicate decision-making as the effect of changing process variables can be severely camouflaged by noise in historical data. In this context, JKTech recently partnered with Boyne Smelters Limited (BSL) to identify strategies to improve the performance of their dry, fixed-speed AG mill.

The product of the AG mill is used as anode cover, providing an insulating barrier and allowing the thermal balance of reduction cells to be controlled. Anode cover is also the most important barrier preventing fluoride emissions to the environment. The BSL AG mill was discharging a product that was excessively fine, making it ineffective at dissipating heat from the underlying reduction cells. There was a desire to limit any capital spending that would normally be considered to prevent the overgrinding of feed (e.g. pre-screens), and so an experimental plan was designed that would enable the effect of two key controllable variables – feed blend and mill power draw – upon product sizing to be established.

The experiment was planned as a central composite rotatable design[1] (CCRD) that would enable multiple parameters to be tested simultaneously, thereby reducing the size of the experiment, while also enabling the effect of these parameters to be established through the inherent process “noise” that would otherwise overwhelm the results of an ad-hoc plant trial.

1. Napier-Munn, T.J., 2014. Statistical Methods for Mineral Engineers: How to Design Experiments and Analyse Data. Julius Kruttschnitt Mineral Research Centre, Brisbane, Australia.

Outcomes

The results of the study indicated that reducing excessive fines production could in fact be achieved by targeting certain feed blends, while maintaining high mill power draw set points (used as a proxy for throughput, which was unmeasured), as shown in Figure 1.

The findings are in the early stages of implementation and monitoring is on-going to assess the long-term benefits of changes in strategy.

The study is a good example of how properly designed experiments can identify hidden potential in processing circuits, thereby mitigating the need for upgrades with capital expenditure.

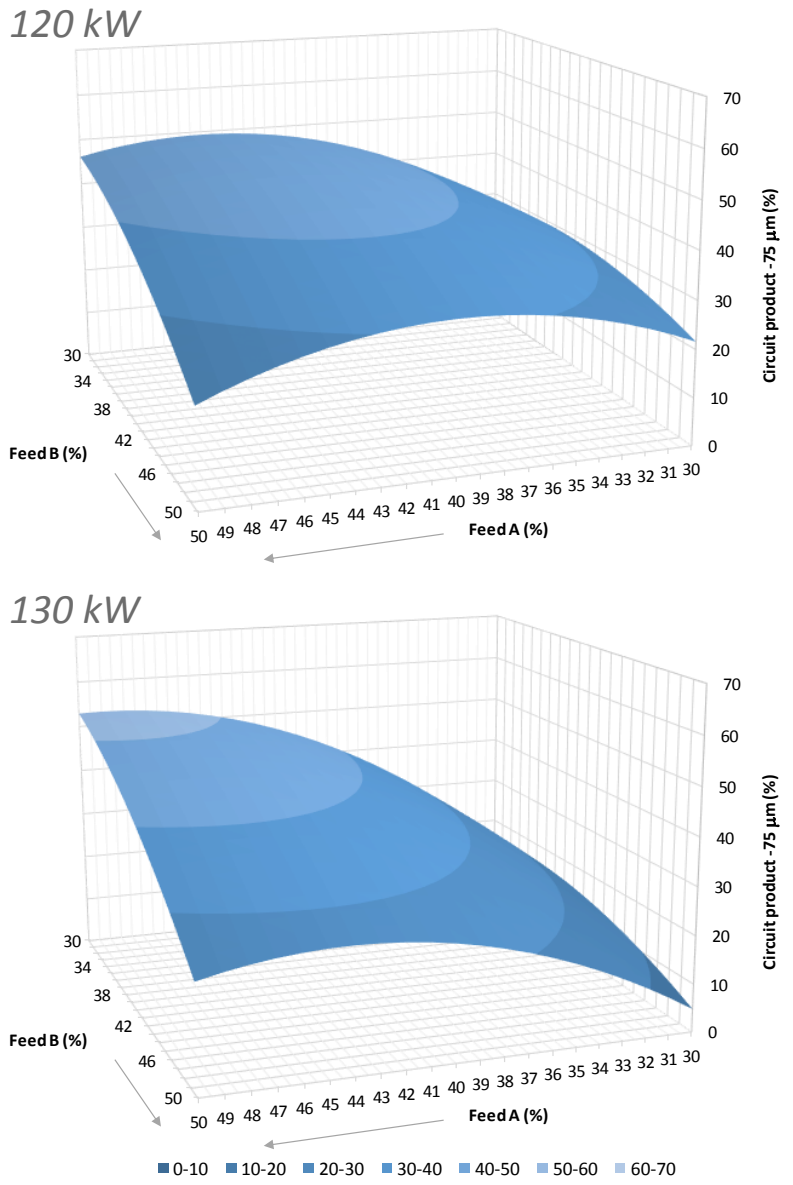

Figure 1. Modelled grinding product fines content at different feed blends and mill power draws. A third feed source, C, comprised the balance of any given blend.

Contact Us

For More Information

Head Office

40 Isles Road
Indooroopilly QLD 4068
AUSTRALIA
Phone : +61 7 3365 5842

JKTech South America SpA

Av. Apoquindo 2929, level 3, of 301
Las Condes Santiago
CHILE
Phone: +56 2 223079710

Website & Email

www.jktech.com.au
jktech@jktech.com.au

Social Media

Facebook.com/ JKTech.Pty.Ltd
Twitter.com/jktech
LinkedIn.com/JKTech Pty Ltd