

Measuring Charge Motion from inside an operating SAG Mill

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ABSTRACT

This paper reflects on how measurements from inside an operating SAG mill might be used to better understand charge motion and energy dissipation within the mill. The paper discusses how the measurements might influence and enhance approaches to energy efficient mill operation when compared with current day modelling techniques. Insights are drawn from measurement inside three operating SAG mills in Australian and Chile using sensors inserted into grinding media and sensors fixed to the rotating mill shell.

The dynamics of the operating mill are so complex that modelling and test work falls short of providing reliable actionable insight for operators and mill practitioners. We propose that a critical missing piece of the puzzle is the measurement of forces from within an operating mill as it is operating. The development of RFID sensors which are inserted into SAG grinding balls and, separately, sensors located on the rotating shell of the mill produce a digital signal which is sent to an antenna and then the data is interpreted on an Edge server and sent to the cloud. A host platform allows the measured variables to be displayed in real time on a web portal. Thus, data measurement from inside an operating industrial SAG mill is now a reality and can be utilized as input into the various mill modelling software packages to track charge motion and improve energy efficient mill optimization.

Given the status of current SAG milling models and the hindered progress toward measuring inside mills, it is reasonable to think that successfully combining real time data from inside the mill with mill optimizing mathematical models might provide an industry step-change to the efficacy of energy efficient mill operation. This paper shows results of measurements inside a mill and explores the possibilities that the measures have in charge motion mill optimization.