Developing a 3D dynamic model to quantify size segregation of stockpile at MMG's Las Bambas

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ABSTRACT

Stockpiles and bins are an integral part of every mineral processing plant, and their design and operation play a significant role in plant performance. Size segregation which is a common phenomenon in most storage and materials handling facilities could have a severe impact on the performance of comminution and classification units downstream. Therefore, ability to model the dynamic response of bins and stockpiles is important for enabling operators to enhance the operation and control of bins and stockpiles and minimise the impact of size segregation on performance of downstream units.

MMG's Las Bambas operation is a major copper mine worldwide placed between Grau and Cotabambas provinces in the Apurímac region, Perú. The Las Bambas concentrator produces a copper concentrate with gold, silver and molybdenum contents. The concentrator consists of two parallel SAG mills each followed by a ball mill closed circuit with primary cyclones. Both lines are fed from coarse ore stockpile (COS) with a capacity over 1,000,000 metric tonnes primary crushed ore. Las Bambas concentrator utilises Advanced Process Control (APC) along with a well-established quality control system to ensure high performance of each processing unit and consequently the overall process. One of the key challenges in maintaining the stability of the process is size segregation in the COS which directly impact SAG mill's performance. Therefore, the 3D dynamic model of stock which is developed in Julius Kruttschnitt Mineral Research Centre (JKMRC) is adapted to quantify the size segregation of the stockpile at Las Bambas and identify control strategies that suit operation of SAG mills at various operating conditions. In this paper, results of analysis conducted on Plant Information (PI) data and analysis of the behaviour of the stockpile at different operating regimes are presented. Paper also presents preliminary results of validation of the 3D stockpile model using industrial data.