## Prediction of Product Size Distribution of a Vertical Stirred Mill Based on Breakage Kinetics

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**Abstract :** In the last decade there has been an increase in demand for fine grinding due to the depletion of coarse-grained orebodies and an increase of processing fine disseminated minerals and complex orebodies. These ores have provided new challenges in concentrator design because fine and ultra-fine grinding is required to achieve acceptable recovery rates. Therefore, the correct design of a grinding circuit is important for minimizing unit costs and increasing product quality. The use of ball mills for grinding in fine size ranges is inefficient and, therefore, vertical stirred grinding mills are becoming increasingly popular in the mineral processing industry due to its already known high energy efficiency. This work presents a hypothesis of a methodology to predict the product size distribution of a vertical stirred mill using a Bond ball mill. The Population Balance Model (PBM) was used to empirically analyze the performance of a vertical mill and a Bond ball mill. The breakage parameters obtained for both grinding mills are compared to determine the possibility of predicting the product size distribution of a vertical mill based on the results obtained from the Bond ball mill. The biggest advantage of this methodology is that most of the minerals processing laboratories already have a Bond ball mill to perform the tests suggested in this study. Preliminary results show the possibility of predicting the performance of a laboratory vertical stirred mill using a Bond ball mill.

Keywords : bond ball mill, population balance model, product size distribution, vertical stirred mill

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