Mineral processing plant capacity based on geometallurgical block model scheduling

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# ABSTRACT

The geometallurgy approach seeks to connect different areas, such as geology, mining, processing, finance, and environment, in an integrated workflow to increase the knowledge of the ore body. It has been used successfully to reduce risks in greenfield and brownfield projects. During the development of the greenfield project, the mineral processing plant capacity is usually estimated using a large sample composite by some drill hole intervals from different deposit areas. This sample is often called a “representative sample”, and it is used to perform a pilot plant test to obtain parameters for plant capacity calculation. For example, a greenfield project with 2000 drill hole intervals and chemical composition data may only have 20 comminution tests from composite drill hole intervals. Considering the ore variability, the risk of over or underestimating the plant capacity is high. Nowadays, it is possible to obtain comminution indices during the sample preparation of the drill hole intervals for chemical composition analysis using devices like the Geopyörä Breakage Test (GBT) and Hardness Index Testing (HIT). These devices need a small sample mass, and the tests are done quickly and cheaply. The comminution indices like Impact Breakage Index (*A\*b*) and Bond Work Index (*BWI*) can be converted into specific energy (kWh/t), and the plant capacity per period can be estimated from mine scheduling, considering the plant operational time as a constraint. It is common to have approximately 8000 hours/year as plant operational time, depending on the equipment availability. Then, it is possible to find the best time in the Life of Mine (LOM) to expand the plant to maintain the concentrate quality and production, for example. The methodology presented here can estimate the plant capacity according to the geometallurgical block model scheduling, avoiding future bottlenecks and supporting investment decision-making.