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Development of a novel approach for integration of fundamental geological parameters with rock strength. Case Study : Los Bronces, Chile.

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Abstract

The last ten years, the focus has been on developing integrated methods to improve both mining and processing, such as: 'Mine to Mill', 'Mine to Port', 'Mine to Metal', and `Geometallurgy`. These effort and new development in technology improved the ore body knowledge [1]. 3D softwares, new instruments and statistical approaches for incorporating the big databases provide a new era in ore body knowledge, mine scheduling and overall exploiting the natural resources.

Mine planning, correct scheduling of production, accurate estimations of annual and monthly throughput, budgeting, maximizing value from the ore body, pit designing, geotechnical issues, effective usage of grinding energy are of vital importance in predicting the plant throughput; especially high tonnage mining such copper porphyries. The hardness or competence of the mined rock is a key property determining both the amount of energy required to grind the ore and to estimate the throughput of the process plant. Therefore, mathematical models for predicting the mill throughputs are developed for a specific designed mill which is used for the model calculations. This approach has its own limitations and not operationally effective. In this study, a new approach is introduced which does not focus on predicting the mill throughput, the approach focuses to understand the rock strength distribution within the ore body.

Development of fundamental understanding in mineralogy and rock strength space has significant contribution in efficient ore processing and mining. Being able to use the strength distribution of an ore deposit provides a platform for better blast hole design, optimum mine scheduling, and optimum conditions for operating the grinding circuits. The rock strength distribution modelling can be the standard practise like as grade, resource, alteration, lithology modelling studies which have not been a routine practise ten years ago.

References:

[1] Baum, W., 2013. Innovations in process mineralogy and laboratory automation.

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