

Ore to be sorted? Guidance via geometallurgical modeling of gold value chain

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ABSTRACT

Optimization of gold mining operations over the whole value chain from ore to saleable product requires efficient use of data sets from various disciplines including but not limited to geology, mining, minerals processing, and environmental.

Ore and particle property-based process modeling platform, incorporating process chemistry, targets for assessing the value chain from mine to saleable product. The geometallurgical simulation aided assessment optimises mining, process metallurgy and economics – in terms of revenue and operating costs - for different operational scenarios. Here, HSC Chemistry® platform was applied, demonstrating its capability to integrate the relevant information of disciplines, and providing highly valuable support and guidance to mining projects and operations with an aim to maximize the generated value.

Sensor-based ore sorting is a technology that has gained popularity during the past few years in the gold mining industry. Sorting has the potential to improve the operational performance and reduce the operating and capital costs per gold ounce produced by removing barren or deleterious particles from the material stream during the crushing stage prior the more energy and water intensive processing stages.

In the example cases, we present and compare several operational scenarios with and without sensor-based ore sorting. The applied geometallurgical simulation models were calibrated based on real test work case data and plant operations.

The presented geometallurgical simulation model comprises the main events in the mining value chain from extraction through minerals processing to saleable product. The comparison of different processing routes evaluates both the technical performance (e.g. throughput, gold recovery, grade) and associated operational costs for each operational stage as well as the overall revenue from the operations.

Key words: Sorting, gold ore, geometallurgy, simulation