AMC’s Hill of Value®: Modelling sequential decisions to transfer strategy optimization to an operational mine plan.

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# ABSTRACT

Mine strategy optimization techniques such as AMC’s Hill of Value® (HoV) use numerical modelling of an operation to rapidly explore a wide range of strategic options. This is achieved by testing and flexing variables such as the cut-off grade, throughput rates, mining methods, sequences and more to understand which of these decision variables are strategically important. Grade uncertainty can similarly be considered by introducing multiple equiprobable inputs from conditional simulations of the mineral resource model. The output of the HoV process is an optimal set of decision variables, guided by one or more objectives (e.g. NPV, strategy robustness, mine life) which can be transferred into an operational mine plan. It enables a high number of strategic options to be rapidly assessed for long-term planning guidance, but at the expense of tactical resolution.

Once an optimal strategy is chosen and committed to a long-term plan, tactical deviations from this plan may be required to minimize short-term disruptions. Ideally, value-accretive tactical deviations could be undertaken without compromising the overall strategy. This is enabled if the appropriate level of detail is in place. Proving the robustness of a selected strategy ensures that any potential tactical choices work within the bounds of the strategy, also constraining the tactical choices that will destroy long-term value. To account for these tactical deviations within a strategy, they must be accounted for in the strategic numerical model.

Tactical decision-making becomes difficult to model numerically when multiple sequential decisions are present. Examples of a sequential decision process in an underground mine include the sequential process of mine scheduling, capital commitment, access development, and production phase of selecting and extracting the ore, stockpiling and processing where one decision in the process has an upstream and downstream impact on the overall mine system. In terms of numerical modelling, mapping out the sequentially dependent mining decisions and system constraints increases the granularity of the model but at the cost of time to build it. This paper investigates a practical method for capturing high resolution sequential decisions in a strategy optimization model and enables these to coherently transfer to the operational mine plan.