

OPTIMIZATION OF MINING SCHEDULING

HAYDER BATISTA MATOS SOBRINHO^{1*}, AUGUSTO YURI CORDEIRO SANTOS¹,
FERNANDA OLIVEIRA MARQUES¹, DOUGLAS BATISTA MAZZINGHY¹

¹UNIVERSIDADE FEDERAL DE MINAS GERAIS

*hayerbatistasobrinho@gmail.com

ABSTRACT

The optimization of mining scheduling involves a series of crucial factors, such as the variety of possible slopes, the flexible block processing time and the mine operation time. Optimistically and concurrently handling elements of mining scheduling pose a vital challenge in the area. A major drawback in that regard is the total amount of possibilities generated in the optimization.

Considering a deposit with fifty thousand blocks, the number of total possibilities when choosing which blocks to be mined is 50000! which translates to an astonishing number of $3E64$ possibilities. Adding restrictions, such as slope constraints, can reduce this number to feasible levels. As we cannot mine a block deep underneath without removing the others above it, we have less possible outputs and therefore less calculation. In order to do that, however, we must consider the restriction between blocks. If the entire dataset is searched for blocks that are restricting a specific block x , a dataset with 50000 blocks will have to be ran through 2.5 billion times. When specific intervals of time to mine a block are put into stake, the number of possibilities grows exponentially.

Today, there are many optimizers that uses heuristic to drastically reduce the computation time; however, without a solid strategy, even as much as writing down the problem will be difficult. One way to approach the last issue is by creating a linear representation of the block model, with a formula that directly relates the position of the block in the deposit with its position in the representation. It makes it so that by knowing where block x is in the model, you can link it to its equivalent in the linear representation and manage the restrictions by manipulating the formula used to generate the representation in the first place. By doing that, the model writing process can go up to 200 times faster.

As the issue is deeply rooted not only in geotechnics and mining engineering, but also in computing science, an efficient and robust approach makes allowance for the calculation method, time saving constraints and geotechnics and geometallurgy aligned objectives, in order to ensure an efficient mining scheduling strategy.

Keywords: Mining scheduling. Optimization. Computing science.