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Application of Enterprise Optimisation considering Ultra High Intensity Blasting

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ABSTRACT

Mine-to-Mill optimization typically employs increased blasting intensity to debottleneck a power constrained comminution circuit. This case study assesses existing engineering research and industrial trials on the interaction between blasting fragmentation and comminution power consumption, and extends its application into the higher blasting powder factor range that is possible with Ultra High Intensity Blasting (UHIB) designs. The cost and power metrics developed in this study were used as inputs to Whittle Consulting's Prober® enterprise optimization software, to assess the life-of-mine impact of variable UHIB fragmentation, on mine Net Present Value.

The study determined that over a blasting powder factor range of 1.2 to 4.3kg/m³, the total unit production cost for the case study was quite constant at US\$12.0 ± 0.2 per tonne of ore processed. Production capacity increases of up to 40% were feasible for an enterprise that was mill power constrained.

Increasing powder factor from a conventional value of 1.2 kg/m³ drove enterprise NPV growth in diminishing steps, up to a powder factor of 4.3 kg/m³. Through that powder factor increase, NPV grew by 26%. Additionally, Life-of-mine NPV per tonne of CO_{2e} emissions increased by 52%, driven by the large increase in energy efficiency of blasting relative to comminution.