BLAST OPTIMISATION AT THE PORGERA GOLD MINE IN PAPUA NEW GUINEA

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ABSTRACT

The Porgera Gold Mine is located at an altitude of 3000m in the central highlands of Papua New Guinea some 600 km Northwest of Port Moresby the capital city. Access to the mine is via a five hour trip on an unsealed road from Mount Hagen the nearest regional centre or 40 minutes via air. The mine operates on a fly in - fly out basis and currently produces ore from both opencut and underground operations with the former providing the bulk of the mill feed. Opencut mining utilises conventional truck / shovel, drill and blast methods on both 10 metre and 14 metre bench heights with the larger benches being restricted to the stripping areas. This paper presents the strategy used and the results of a blast optimisation process in the opencut that was a joint effort between the mine personnel and the explosives manufacturer/supplier. The blast optimisation program was based on a team approach that utilised the principal of small incremental changes in one blast design parameter at a time to gradually optimise the drill and blast process. The initial parameter chosen was subdrill, as the benches were consistently being overdug, with reductions being made in 0.5m increments. The process resulted in an average 1.5m reduction in the subdrill with no increase in toe or reduction in digging rates whilst saving some A$2.1 million per annum. Crushed 20-25mm aggregate was introduced as the stemming material confining the explosive energy at the top of the bench enabling the stemming lengths used in each of the rock types to be optimised. This work resulted in an 0.5m - 1.0m reduction in the stemming length costing A$0.6 million per annum in additional explosives but balanced against this was improved fragmentation at the top of the bench. The pattern design optimisation program resulted in an 18% and 7% expansion in both the black sediments and incompetent rock types blast design respectively without any affect on digging, haulage, crushing rates, the generation of oversize or toe etc. In the hard diorite the design was reduced by 8% to improve fragmentation and digging rates. The initial stage of the blast optimisation process has resulted in a drop in powder factor for all rock types (black sediments 0.22 - 0.17kg/T, incompetent rock 0.22 - 0.19kg/T, diorite 0.29 - 0.28kg/T) resulting in an overall saving in drill and blast of at least A$1.5 million per annum with improved fragmentation, digging and crushing rates. Future work will concentrate on further blast design expansion in the softer rock types together with minimising overdrill.

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