

Getting Underground: Design and construction of a portal in a pit with moving walls.

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ABSTRACT

Achieving quick underground access after the completion of an open pit mine can be critical to maintaining project value and ensuring regular ore feed to the mill. This paper outlines the design and construction for two portals in an active open pit to commence underground development quickly whilst installing appropriate ground control to maintain long term access.

Implementation of the portal designs was complicated by the change in underground design from hanging wall access to footwall access late in the life of the open pit due to preferable ground conditions. The portal locations did not have easy access for ground support installation integrated into the pit design due to the timing of the underground design changes. Practical implementation of the ground support systems subsequently became a key part of the project.

Intact rock strength, rockmass and structural information were calibrated against pit displacement monitoring as the basis from which the portals were located and ground support schemes designed. Conditions around one of the portals necessitated numerical modelling of one of the portals to estimate the appropriate level of ground control required. The design was completed whilst the open pit was actively on-going and the portal areas not entirely exposed. The rock mass assessment and analysis for the two portals indicated different ground support scheme capacities would be required. The expected level of control for one of the portals also necessitated the use of monitoring with extensometers and load cells to ensure the rock mass response and ground support scheme performed as planned.

Construction of the portals demonstrates the benefit of a considered design process, a plan which allows practical installation of ground support schemes where access is limited, the benefit of ongoing monitoring to ensure performance remains within design limits and the challenges involved working within an active pit with limited floor space.