DEPARTMENT OF MINING ENGINEERING RESEARCH

A preliminary qualitative evaluation of a hydraulic splitting cylinder for breaking rock in deep-level mining

Hydraulic rock-splitting cylinders have proved successful in numerous civil and construction applications. The purpose of this study was to conduct a preliminary qualitative evaluation of the applicability of the hydraulic splitting cylinder in deep-level mining with the aim of recommending equipment modifications and operational practices. The particular instrument used in the study was the DARDA[®] hydraulic splitter.

Conventional drill-and-blast practice in deep-level mining often impacts adversely on the immediate environment. Alternatives are periodically sought for efficient, continuous and safe rock-breaking in situations where conventional blasting is undesirable. Mining companies, equipment manufacturers and research institutions have conducted a considerable amount of investigation work on numerous methods of non-explosive mining, including the use of the hydraulic rock-splitter.

Several trials were conducted underground. The most challenging aspect of mechanical rock-splitting is to create a second free face in the stope. The trials evaluated four different "cut" layouts to achieve this objective. The trials highlighted the limits of the equipment in its current phase of development, as well as the importance of quality drilling in terms of collaring the hole, hole length and directional accuracy. In the presence of a second free face, the splitter becomes far more effective. The unit is simple in design and is easily integrated into existing mining operations. It does not require a technically skilled workforce or expensive maintenance either.

Rock-breaking by using a rock splitter could have a place in niche applications in an underground mining operation, with some equipment modifications and further development of the process to establish a freebreaking face. General operational difficulties experienced underground during the trials are summarised and possible solutions recommended.

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