

## عنوان مقاله:

The performance of bolt-reinforced and shotcreted in-stope pillar in a rockburst prone areas

## محل انتشار:

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## خلاصه مقاله:

Historically, the design of the in-stope pillar in underground excavations has been based on empirical formulae and numerical modelling. Although these design methods have been extensively applied in several gold mines in South Africa, rockburst, in-stope pillar burst/failure are continuously reported as the major problem faced by mines. Therefore, this study attempts to compare the performance of the shotcreted and bolt-reinforced in-stope pillar with the bolt-reinforced in-stope pillars. Numerical modelling was simulated focusing on the major principal stresses ahead and along the de-stress cuts, damage along the in-stope pillar (yieldability of the in-stope pillar), and the rate of energy release along the in-stope pillar. Owing to that, seismic events with  $\log P \geq 1$  were used through assessing their source mechanism, damaged area, rock mass response after the event, and source parameters for the events. The results of the study have shown that the in-stope pillar along different de-stress cuts was extensively yielding in the model. Very high-stress magnitudes were forecast in a zone ahead of the advancing face. Further results from a seismic point of view have shown that the estimated source mechanism from different case studies had a dominant double-couple component, and the steeply dipping nodal plane aligns well with the NNE-SSW to the dyke. Shear-type failure on the faults/dyke was the most probable source mechanism of the events. Visually, observation results have shown that most of the bolt-reinforced in-stope pillars resulted in extensive scaling and fracturing during the dynamic movement of the ground, while bolt-reinforced and shotcreted in-stope pillars were noted to have minor or no damage during the dynamic movement of the ground.

## کلمات کلیدی:

Pillar burst, Seismic source mechanism, numerical modelling, Pillar design

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