Calibration of Yielding Pillar Performance in Deep Level Gold Mines

T. Zvarivadza and F. Sengani

ABSTRACT:

The performance of the yielding pillar in a deep level gold mine has been evaluated using Ground Penetrating Radar, Borehole periscope, and Abaqus Explicit numerical modeling. The objective of the study was to understand whether the design of the yielding pillar was not sufficient to maintain the stability of the yielding pillar. This research was conducted after multiple failures of the yielding pillar. Most of the failures occurred after minor seismic events that occurred in the vicinity of the de-stress cuts and long hole stopes. The results of the study have indicated that the first 1m of the yielding pillar towards the core of the pillar was extensively fractured. Moderate fracturing occurred between1.5 m to 2m within the yielding pillar and minor fractures were found in the core of the pillar. The results from Ground Penetrating Radar were similar to the borehole camera results. Further analysis conducted by the numerical model have shown a gradual decrease in sigma 1 (the greatest compressive stress) from the pillar surface towards the core of the pillar. A minimum stress of 80MPa was simulated at the core of the yielding pillar and maximum stress of 120 MPa was simulated from the pillar walls to 1m towards the core of the yielding pillar.