

ABSTRACT

The majority of bord and pillar coal mines world over utilizes uniform pillars across a panel for ease of layout and simplified standard mining sequence. This is however, regardless of the fact that the distribution of vertical stress across all the pillars from barrier pillar towards the centre of the panel is not uniform.

The distribution of vertical stress, safety factor and seam convergence across panels at various depths have been investigated through the Lamodel software package. Further verification of the distribution of stress has been done through underground investigations on the effects of stress on pillar scaling in a main development panel of a bord and pillar coal mine. Both numerical and underground investigations have confirmed that in-panel pillars close to barrier pillars have higher safety factors than those in the middle of a panel.

Based on this, further numerical modelling using the Lamodel package has been conducted focusing on the size and location effects of barrier and in-panel pillars in bord and pillar panels at different depths. It has been found that it may be possible to improve coal resource utilization without significantly affecting stability by slightly reducing the size of those pillars close to barrier pillars, changing sizes of pillars in the middle of the panel and considering barrier pillar partial extraction.

Based upon the indicators identified in the models investigated, a panel's overall extraction in bord and pillar primary development may be increased by between 0.01% and 0.88% depending on depth and layout configurations.