DEPARTMENT OF MINING ENGINEERING RESEARCH

Rockburst support in shallow-dipping tabular stopes at great depth

This research investigates the unique problems associated with the design of rockburst support for shallow-dipping tabular excavations. These designs are particularly problematic when the stoping width is very small. In steep dipping ore bodies, the layouts and mining methods can be selected to ensure that miners never enter the stopes. Only the access drives need to be protected by rockburst-resistant support. In shallow-dipping ore bodies, this problem is more difficult as miners enter the stopes and the entire hanging wall needs to be supported. A simple analytical model is used to investigate the implications for support design as a result of the convergence associated with the tabular geometry and the possibility of rocks being ejected during a rockburst. This illustrates that a support system is required that is initially stiff, but should also be yieldable to survive the convergence in the back areas. By trial and error, the historic support solutions in South African gold mines evolved into a system of timber packs and elongates to meet these requirements. When considering the three accepted key functions of modern rockburst support methodology – reinforce, retain and hold – the typical support design for these shallow-dipping ore bodies does not meet all these requirements. The rock is highly fractured and fall-outs occur between roofbolts during rockbursts as areal support is difficult to implement. Steel mesh is not used as it is often destroyed during cleaning operations. Solving this problem is of critical importance to ensure the viability of deep South African gold mines in the future.

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