Evaluation of Tendon Support in Anisotropic Jointed Rockmass

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ABSTRACT:

In underground mines, it is of paramount importance to ensure that local support design and installation is carried out in the best possible manner. A study was done to evaluate the adequacy of tendon support used at a Great Dyke platinum mine in anisotropic jointed rockmass. A comprehensive analysis of the geotechnical data collected was done using the Q rating, RMR and MRMR systems. The current tendon support system was evaluated using the roofbolt factor of safety approach, fallout thickness evaluation and numerical modelling for adequacy in geotechnically challenging ground conditions. Rockmass classification techniques used showed that the ground condition where the study was carried out is indeed weak, hence an adequate local support system is required to prevent falls of ground attributable to wedge failure. GPR scans and observations showed that the fallout height thickness is now 1.8m, instead of the 1.5m used in the preliminary stages of mining operations. Numerical modelling using JBlock software was used to deduce potentially unstable blocks and the probability of wedge failure under the current tendon regime. From the evaluation of the tendon systems used at the research area, the authors concluded that the current tendon system used is not adequate to meet the desired demand. A newly designed system that can improve safety and productivity was proposed following a comprehensive empirical and numerical analysis. The proposed tendon system is more economical with further benefits of improved safety. It is also recommended to mining companies to incorporate the use of risk evaluation softwares such as RiskEval to assist in the quantification and prediction of fall of ground related injuries in the design of support systems Local support systems also need to be updated with respect to geotechnical conditions in order to optimize the mine's key performance indicators (KPIs).