GEOTECHNICAL AND CORROSION STUDY OF ROCK BOLTS OF DRAA SFAR MINE (MARRAKESH, MOROCCO)

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ABSTRACT

This paper presents the project of improvement of the management of underground mine (mine of Draa Sfar, Marrakesh, Morocco), and its first scientific results, Draa Sfar mine is ranked among the deepest mines in North Africa. Currently, violations depths exceed 1,100 meters. Thus we are witnessing the instability phenomena of land which demonstrate the failure of retaining quote some areas. The most frequent problems of instability especially problems of rock falls due to non-resistance depending bolts and buckling of attack galleries siding with a direction parallel to the foliation. The object of this project is the development of original and reliable models, designed by analytical and empirical learning, dedicated to the relation support-stability stability of underground structures. These models will be integrated into the channel of exploitation of the mineralized deposit.

Keywords: Geotechnics, underground, instability, mining, bolts.

INTRODUCTION

From a methodological point of view, the improvement of the forecast of the phenomena of instability of the works is expected to the capacity with tools that enables:

- Develop an appropriate tool, which suggests estimate of retaining structure for a block the size of which is of the order of 5m according to three axes of the space;
- Integrate data assimilation techniques;
- Make a first 3D model to detect zones characterized by intense fracturing and thereafter to avoid during mineralization tracing works;
- Realize other 3D models which propose the distribution of the estimate of retaining structure by bolts of anchoring (bolts modified by chemical composition or handled) in every respect of the modelled massif.

These generalizations will allow to estimate the capacity of these models to adapt themselves to the changes of timescales and space. In time, this project allowed to study the capacity of the models, to plan the instabilities, to choose the estimate of retaining structure according to the crossed zone and afterward an optimization of the estimate of retaining structure to avoid any zone of instability the treatment of which will be difficult or unprofitable. The project is organized around two shutters:

- The shutter1 concerns a geotechnical study of the site to allow the elaboration of a system of retaining structure to assure the state of stability of the excavated works:
  - Falling blocks and buckling of attack galleries siding with a direction parallel to the foliation.
The shutter concerns the study of the corrosion of system of retaining structure to set up, Figure 1:

Fig.1 - Split Set bolt surface corroded enlarged x 2000 (photo A) and 5000 x (picture B)

RESULTS AND CONCLUSIONS
To optimize the choice of retaining estimate, we have established 3D block models, with an appropriate tool.

- Long term acquis:
  - Real-time data sharing of instability;
  - The rapid exchange of analyzes by the observatories;
  - The information exchange diverse but necessary for an intervention post-instability (nature of rock massifs, conditions of the environment).

- The long-term perspectives are:
  - Improve the localization of the events of instabilities;
  - Maps produce of intensity in case of fall of blocks;
  - Update the information necessary for the operator in case of major incidents.

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