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Short-term geological modelling for improved mine planning at Isibonelo Colliery

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Abstract

Isibonelo Colliery is an opencast operation employing the strip mining method, and for short-term planning, up-to-date geological information is required. The colliery currently depends on the annually updated geology resource model information for input into the three planning windows (short, medium and long term). To improve and optimise on short-term mine planning, short-term geological model information has become a requirement. This research project was undertaken to fulfil the Anglo-American Coal South Africa's Operation Management System (OMS) requirements. This research report focussed on closing the gap between OMS requirements and current practice, by creating a short-term modelling process to fulfil the requirements for both mine planning and rock engineering disciplines. Highwall mapping techniques such as digital photogrammetry from drone highwall flyover, as well as use of total station surveys to map lithological contacts for input into the model were investigated and tested. The study area focussed mainly in the far south portion of Isibonelo South pit where most of the data was collected to build the process of short-term modelling as a test case. Short-term planning requirements using latest geological information was achieved and mine designs started to improve. Subsequent strip reconciliations showed improved correlation between planned and actual, especially in the dragline volumes from 3% to 0.5% over two mining cuts in the South pit. Coal recovery improved by 2.1% between October 2017 and April 2018. There was good coal seam correlation between the short-term, survey and resource model. The softs(weathered) horizon still need some further work to close the gap between planned and actual thicknesses.

The author recommended the use of drones for highwall mapping and down the hole wireline logging of selected pre-split holes to be adopted as methods of acquiring data for short-term geological modelling, and optimise on short-term planning.

Key words:

Geology, Highwall, Mapping, Operation Management System (OMS), Short-term model, Drone.