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OPTIMISING THE USE OF THREE-DIMENSIONAL DATA TO LOWER GOLD GRADE DILUTION BY CONTROLLING STOPE WIDTH IN THE MINING OF ULTRA-DEEP COMPLEX ORE BODIES.

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ABSTRACT

Excessive hanging wall or footwall dilution in narrow, tabular gold mines affects the payability of the mine. Three-dimensional (3D) scanning of stope faces is an option for quickly creating face maps to incorporate into a mine's digital map. As this would make data capturing less time-consuming, the geology team now has more time to guide production regarding stopping width specifications and possibly reduce associated dilution. Unfortunately, Mponeng Mine's current 3D scanner is bulky, expensive and unavailable for direct use by the geology team.

Mponeng Mine investigated more convenient alternatives for 3D scanning of stope faces. Since March 2020, certain Apple products have incorporated a LiDAR scanner. The iPad Pro scanner, with a scanning range, of five metres, was tested in the mine mock-up at the University of the Witwatersrand. A 3D-printed iPad holder was created, holding a compact yet powerful LED light. DigiMine tunnels and stopes were scanned using this hardware and a variety of software. The 3D Scanning App supplied with the iPad Pro was found adequate for the identified purposes. Underground testing was then carried out in the ultra-deep stopes of the Mponeng Gold Mine. These scans can be geo-referenced into the mine's existing digital models. In addition, they can capture the contacts of the ore body. However, the iPad Pro is not waterproof, and the large screen makes it susceptible to damage. So, the mine is now testing LiDAR-equipped iPhone 13 Pro as a more robust, compact option.