The use of LiDAR to increase efficiency in fibrecrete only temporary support in a strip and line shaft

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# ABSTRACT

The geotechnical assessment of a cutting can be a time-consuming task. In typical underground development where multiple headings are available, it is not a critical issue as production will continue elsewhere. In the strip and line of a shaft, only one heading is available. The accuracy and efficiency of this process is integral to the overall efficiency of the project and safety of the workers.

By using a fibrecrete only temporary support system, project efficiency is improved. This can be further improved through the use of LiDAR scans to acquire data ahead of schedule and improve the monitoring process.

LiDAR scans were taken using a Hovermap LiDAR Scanner prior to and after the fibrecrete sprays. To allow for comparison and alignment between scans, numbered crosses were painted on the wall before the pre-fibrecrete scans. These scans had limited impact on the overall strip and line cycle due to aligning with geotechnical mapping and the speed of the scans. The comparison of the pre- and post-fibrecrete spray scans, using the 3D point cloud processing software CloudCompare, allowed for a heatmap to be produced. This showed the thickness of the spray for quality assurance checks and provide feedback to the operators. The post-spray scans were also imported into Deswik, a CAD software, to be analysed and extract key data for the lining cycle.

The ability to analyse the thickness of a whole cut reduces the personnel bias when choosing testing locations in the typical method of drilling test holes. The variation in thickness was also great to show the operators as this may indicate weaknesses or strengths in their technique that can be improved.

The uses of the LiDAR for fibrecrete quality assurance and data analysis opens the way for more accurate and efficient methods within the strip and line shaft process.