

## Shotcrete Performance Optimisation and Audit Using 3D Laser Scanning

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**Abstract :** In many underground mining operations, shotcrete is used for permanent rock support. Shotcrete thickness is a critical measure of the success of this process. 3D Laser Mapping, in conjunction with Jetcrete, has developed a 3D laser scanning system specifically for measuring the thickness of shotcrete. The system is mounted on the shotcrete spraying machine and measures the rock faces before and after spraying. The calculated difference between the two 3D surface models is measured as the thickness of the sprayed concrete. Typical work patterns for the shotcrete process required a rapid and automatic system. The scanning takes place immediately before and after the application of the shotcrete so no convergence takes place in the interval between scans. Automatic alignment of scans without targets was implemented which allows for the possibility of movement of the spraying machine between scans. Case studies are presented where accuracy tests are undertaken and automatic audit reports are calculated. The use of 3D imaging data for the calculation of shotcrete thickness is an important tool for geotechnical engineers and contract managers, and this could become the new state-of-the-art methodology for the mining industry.

**Keywords :** 3D imaging, shotcrete, surface model, tunnel stability

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