

Laser Scanning of Shotcrete Thickness

CASE STUDY - LKAB Kiruna, Sweden

In Scandinavia, shotcrete is normally used as final lining for permanent rock support in tunnelling. Shotcrete thickness is a critical parameter for the success of the process.

Bever Control has developed a laser scanning system that can be operated by the operator from a mobile vehicle like a drill rig or shotcrete robot. The system is robust and well suited for the environment in tunnel construction.

Scanning results are presented in a topographic map of the tunnel surface. The system gives the operator measurement results during spraying, as well as it will be possible to present a documentation of thickness over each blast/setup of the shotcrete operation.



Movements during shotcrete spraying is monitored and corrections are applied if needed. The system is handled by the shotcrete robot operator.



Placement of Bever 3D Profiler, automatic docking under a protective hood for easy cleaning





A typical 2D cut of contour lines before and after shotcrete spraying.



Surface plot showing thickness of applied shotcrete. Yellow colour is around 0 cm and purple 20 cm or more.



Graphical representation of all single measurement points in a scan.

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2D plot showing graphically the sprayed result divided in three classes of thickness:

Red: Insufficient Green: Sufficient Green stripes: More than sufficient

Thickness is measured with better than 10 mm accuracy as average per m². This is proven with extensive drill tests. LKAB Berg & Betong has reported more than 20 % savings on concrete volume, due to more accurate thickness control and operator training. In one year, the concrete volume was reduced from 2,8 m³ to 2,2 m³ per tunnel meter. Reduction was possible due to good knowledge of thickness distributions and LKAB Berg & Betong could reduce systematic shotcrete volume. Based on an annual spray concrete work of about 30 million USD per year this will give significant savings.

Bever Control a.s

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Bever Control Story

Norwegian contractors introduced the concept of computer controlled drilling as early as 1979 when the first AMV computer controlled jumbo was set in operation. Bever Control is the pioneer company for this technology world wide. We have delivered our system to more than 140 drill rigs and have set the standard for the performance of computer controlled drill rig systems.