# GML: Construct to Design in Real-Time

The GML is the latest industry technology, proven to significantly improve the efficiency and quality control of tunnel constructions.

Using LiDAR scanning technology, fast computing and patented processing techniques, the GML enables real-time visualisation of BIM point clouds against design profiles.

This allows crews to track and verify construction while in cycle. The technology ensures that every stage is built to design.

### HIGH QUALITY DATA IN THE FASTEST TIME

Given its fast computing and high-accuracy scan registration, the GML computes high-density point cloud data in real time.

Each highly precise image contains tens of millions of points, giving users high-resolution 3D information of the current construction against the desired design profile.

### LIVE INFORMATION, FOR ON-THE-SPOT VERIFICATION

Highly accurate, detailed information such as overbreak, underbreak and shotcrete thickness is provided live to tunnelling crews with no manual processing. Real-time feedback allows crews to verify their construction, on the spot.

### IMPROVED CYCLE TIME

Providing construction guidance and instant rectification at every stage allows huge efficiency gains.

Together with the minimisation of rework, and continuous improvement with each advancement, the system allows for more efficient tunnelling.
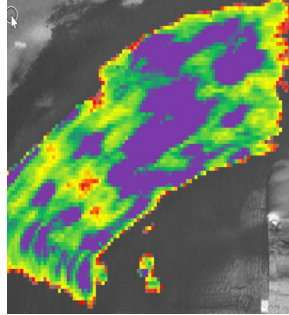
groundprobe.com

# Features and Benefits

### REDUCED REWORK

Areas of non-compliant construction can be detected and rectified immediately, reducing the need for labour-intensive, time-heavy, and costly rework.
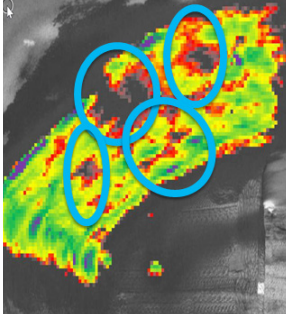


Poor Application: Scan After 3.0m$^3$          Rework: Scan After 4.2m$^3$

### IMPROVED QAQC AND REPORTING

The GML ensures every stage is built to the highest quality through its high-accuracy scan registration. GML data can also be streamed to the engineers and managers at the surface in near real time.

This expedites turnaround for QAQC checks and effective communications of as-built information amongst engineers and construction crews.

### GEOREFERENCED 3D DATA

All data gathered by the system can be fully georeferenced. This allows users to export a georeferenced point cloud of a scan or specific highlighted areas.

The point cloud will import directly into the BIM model software, correlated to the exact location.
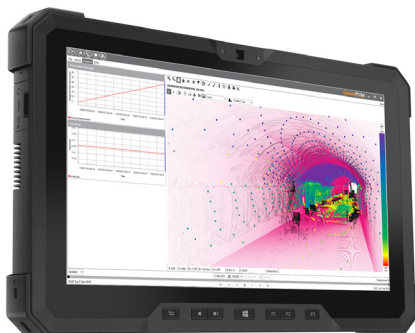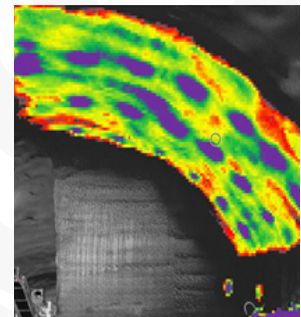


### RAPID DATA STREAMING

The GML uses proprietary compression techniques to optimise its data. Deformation data can be streamed to engineering and survey crews in the office to resolve time-critical bottlenecks. Deformation data is compressed to 1/100th of its size, for fast streaming over even low bandwidth connections.

### SHOTCRETE VOLUME CONTROL AND REDUCED WASTAGE

The system provides live guidance during the shotcreting stage, allowing the operator to spray to the desired tunnel profile and reduce overspray. The system has been proven to reduce shotcrete usage by over 20%. This decreases the associated time and cost of this operation, and the environmental impact of shotcrete manufacturing. Users can also estimate the volume of shotcrete needed to reach the design profile, giving engineers control over the volume of shotcrete orders.
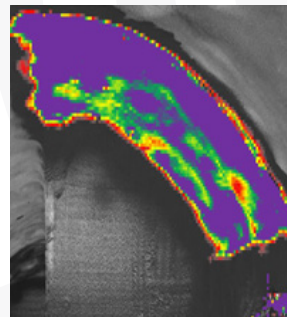


Shotcrete Sprayed 6.0m$^3$          Shotcrete Sprayed 4.0m$^3$ (33% Reduction)

### MULTI-SYSTEM, AUTOMATED DATA MANAGEMENT

All scans are stored and managed automatically, with no manual intervention required by any user at any stage. The database system manages data from multiple scanners across multiple sites concurrently and without difficulty, critical for BIM compliant scanning.

### CONCURRENT USER ACCESS

All GML scan data can be synchronised to a central server to ensure a single source of truth, with immediate availability to multiple concurrent users. This allows them to access and view all the uploaded data from a single dashboard. Group permissions can also be set to control data access.

**decision confidence**™