

SiteMonitor*Volumes*

Automated Surface Measurements Using Laser Scanners



Rapid mine-wide terrain model updates

Remote depletion surveys of active mining areas

Rapid month-end stockpile measurements

Continuous stockpile volume monitoring



High speed

Up to 11,000 measurements per second

Complete coverage

Rapid measurement of thousands of points rather than single spot locations

Flexible measurements

High speed laser scanner does not need a permanent installation

Extremely portable

Mobile system can be moved into areas of limited access

High performance

Up to 1,000m range; up to 4mm accuracy

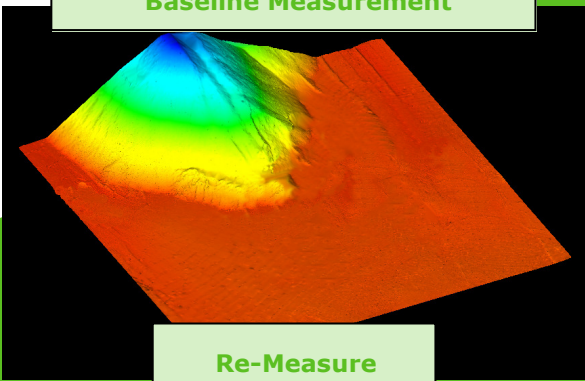
Competitive cost

Flexible hardware options to suit performance requirements



Building upon the proven SiteMonitor system, 3DLM have created SiteMonitor*Volumes*, a revolutionary system integrating advanced laser scanner technology with simple-to-use software, to create semi-automated and autonomous volume measurement workflows

Baseline Measurement



Baseline Measurement

As with any volume measurement project, a baseline measurement is required. This can be a simple plane or a complex surface model. If a baseline measurement does not already exist, the first data collection campaign can be used.

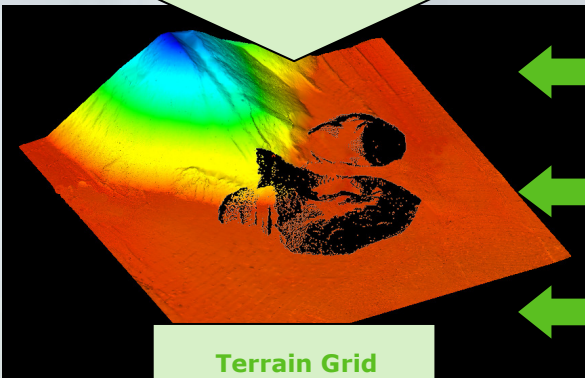
From this baseline measurement, a regular grid is generated in the X-Y plane, with each node having a Z value (elevation).

Repeat Surveys

As data is captured and fed into the software, a mesh is triangulated from the data representing the new surface of the stockpile. The X-Y grid is interpolated from the new surface, and the node elevations compared to the baseline measurement to generate a new volume.

Data coverage is displayed on-screen in real-time, guiding the operator to areas not yet surveyed in the active campaign.

Re-Measure Survey



Laser Scanner Data

Fixed, mobile or dynamic

Traditional Survey Data

*Total Station data
GPS points*

SiteMonitor Data

Data Capture module

Data Sources

Point data can come from a variety of sources.

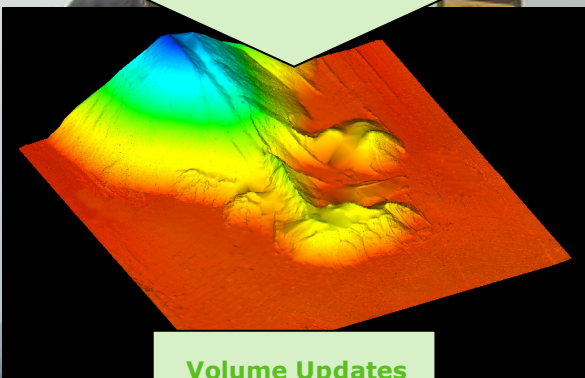
Laser scanner data, with its high speed and high point density, can be augmented with GPS points from a rover where shadows areas occur.

Survey data captured traditionally (i.e. with total stations) can also be imported.

Data transmission via:

Email • Wireless LAN • File import

Terrain Grid Auto-Update



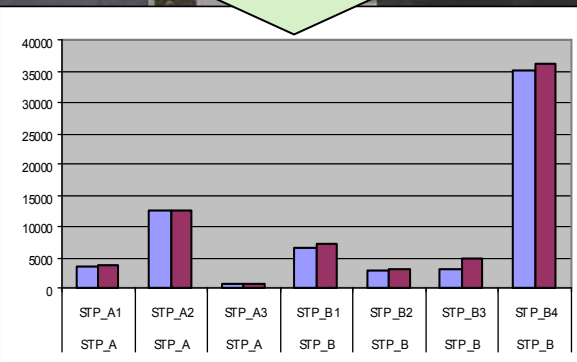
Additional features

- Graphical display of survey results (wireframes, elevation contours, coverage maps etc.)
- Survey history means only areas of change need to be re-measured
- "Single-click" operation to acquire data
- Scan-positions automatically geo-referenced using reflectors placed around areas of interest
- Reporting and alarm functions alert operators of events: low coverage, shift volume reports, depletion history reports, etc.

Laser scanner deployment

- Multiple scanners permanently fixed to pillars for continuous autonomous surveys using Scheduler module
- Mounted on tripods for ad-hoc periodic surveys and flexible scanner locations
- Mounted on a vehicle and guided by GPS for fast survey completion using a single scanner
- Mounted on an all-terrain trolley or Remote Survey Vehicle for access to difficult/hazardous areas
- Multiple scanners mounted on a vehicle with GPS/IMU navigation (e.g. **3DLM StreetMapper** system)

Volume Updates and Reports



Site	Stockpile	Reference	Volume	Change
STP_A	STP_A1	3564.329	3712.442	148.113
STP_A	STP_A2	12427.202	12311.995	-115.207
STP_A	STP_A3	654.257	859.428	205.171
STP_B	STP_B1	6424.861	7392.126	967.265
STP_B	STP_B2	2678.032	3065.342	387.31
STP_B	STP_B3	3157.924	4893.195	1735.271
STP_B	STP_B4	35076.376	36076.224	999.848

3D Laser Mapping Ltd. is a recognised expert in the use of laser scanners for mining and 3D monitoring.

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