

RiMINING

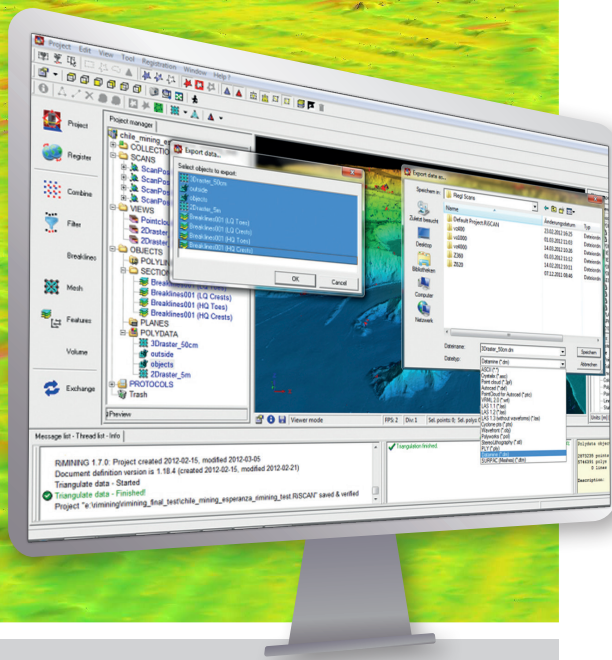
for *RIEGL* 3D Laser Scanners

- **workflow automation**
- **automatic data registration**
- **advanced filtering algorithms**
- **geotechnical analysis**
- **feature extraction (contours, profiles, breaklines)**
- **volume calculation, surface comparison**
- **support for many mining software exchange formats**
- **full compatibility with RiSCAN PRO**

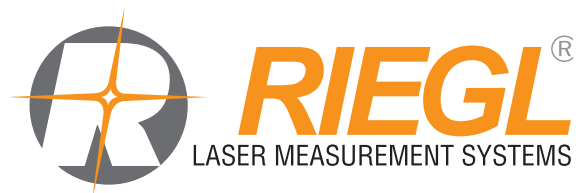
RiMINING is designed to optimize and simplify scan data processing in open-pit mining. The focus of the software design is on workflow simplification and automation. For advanced data-processing full compatibility with RiSCAN PRO is provided.

RIEGL VZ-xxx field-data import and registration without any targets speeds up field-surveying tremendously. Automatic Registration is accomplished utilizing state-of-the-art alignment algorithms in combination with RIEGL VZ-xxx built-in sensors (GPS, compass, inclination sensors). Advanced filtering algorithms enable automatic elimination of vegetation, objects and outliers. The integrated LIS GeoTec Plugin provides geotechnical analysis tools of scanned rock surfaces. Typical mining post-processing tasks like break-line detection and volume calculation are fully supported. The extracted information can also be utilized by mine planning software because of RiMINING's support for various mining exchange formats.

- **Surveying of open-pit mines, quarries and dump sites**
- **Change detection of excavated areas**
- **Fillgrade and mass calculation**
- **Rockface stability analysis**
- **Extraction of input data for site modeling**



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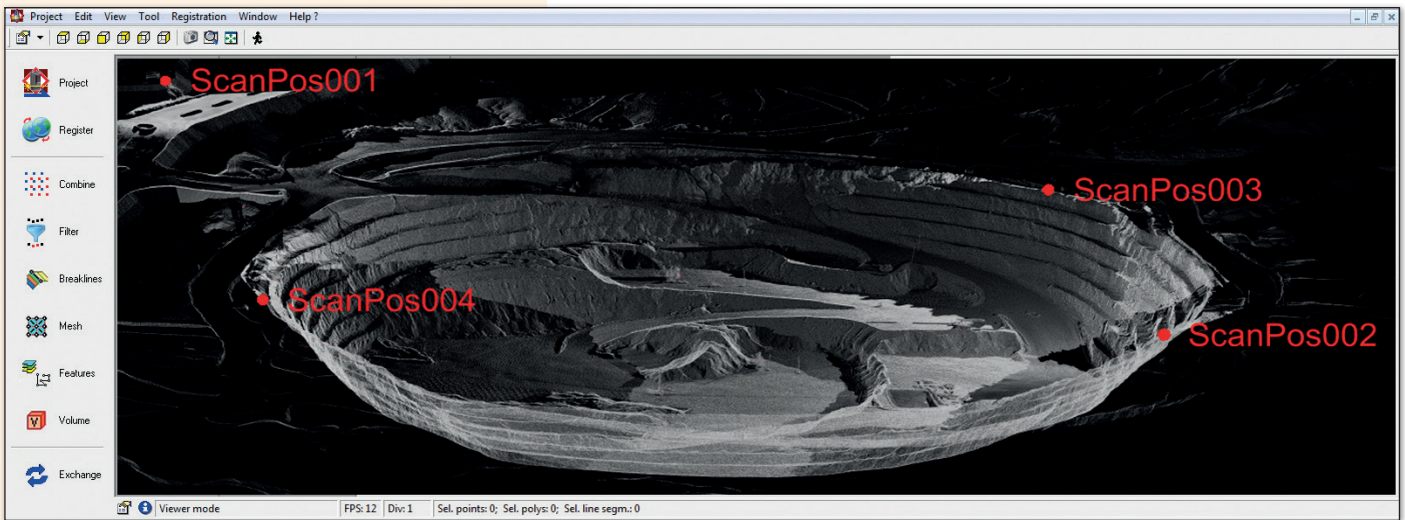
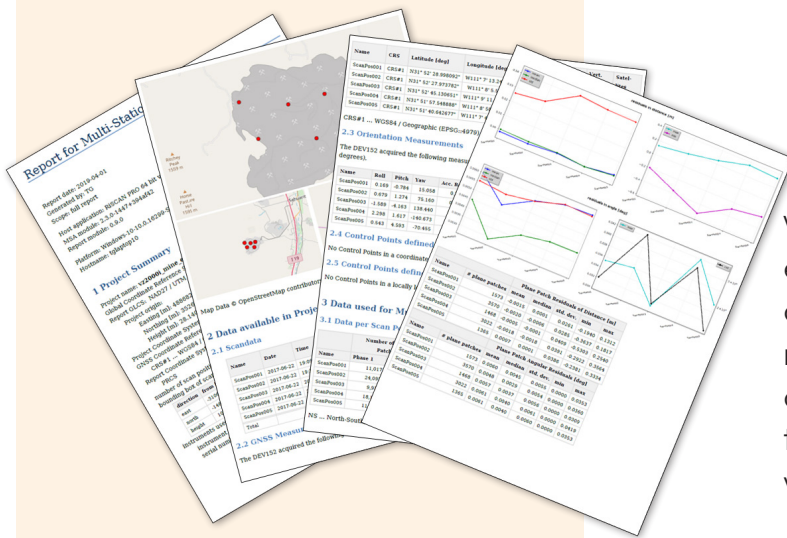


Fig.1 Sample of an open pit mine scanned with a **RIEGL VZ-1000** and automatically registered in **RiMINING**



Voxel datasets and plane patches are extracted from the acquired scan data automatically. This information is used to register the scan positions without the use of any artificial target, which reduces the onsite time significantly. Registration quality can be verified by a detailed statistical report.

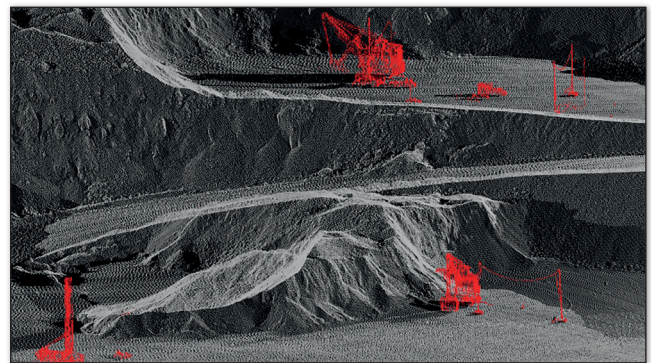
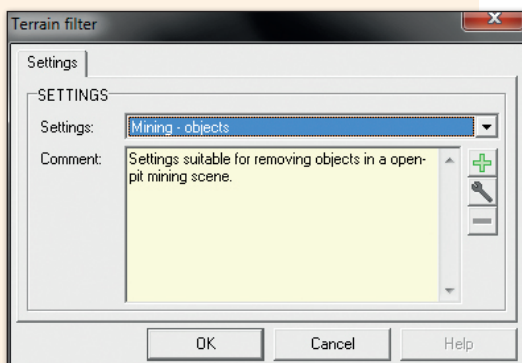


Fig.2 Automatic filtering of artificial objects



To create reliable data sources for meshing, all artificial objects must be eliminated from the point cloud.

RiMINING provides an automated filter algorithm to remove these objects. Predefined settings for artificial objects, vegetation, and points underneath the real surface are provided. All settings are configurable by the user.

Breaklines are automatically extracted from the scan data and classified as toe and crest lines. A powerful triangulation algorithm is used to create accurate watertight surfaces of the mine site utilizing a fusion of acquired scan data and the extracted breaklines. These surfaces are used for the creation of profiles and sections and as data bases in 3rd-party mine planning software. Intelligent smoothing- and decimating-functions are provided to reduce file sizes and data redundancy while ensuring integrity of the surface geometry information.

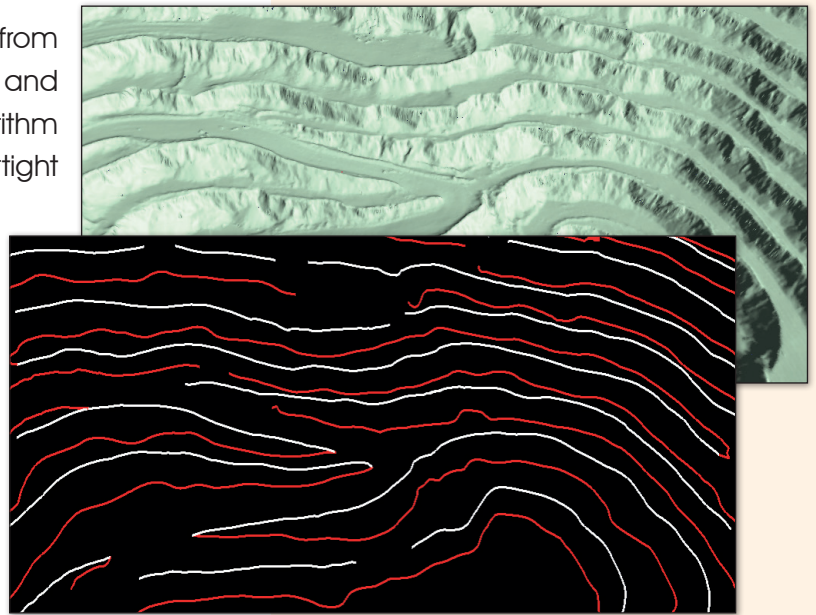


Fig.3 Breakline extraction tool

Differences between two surfaces can be visualized and calculated as cut- and fill-volumes.

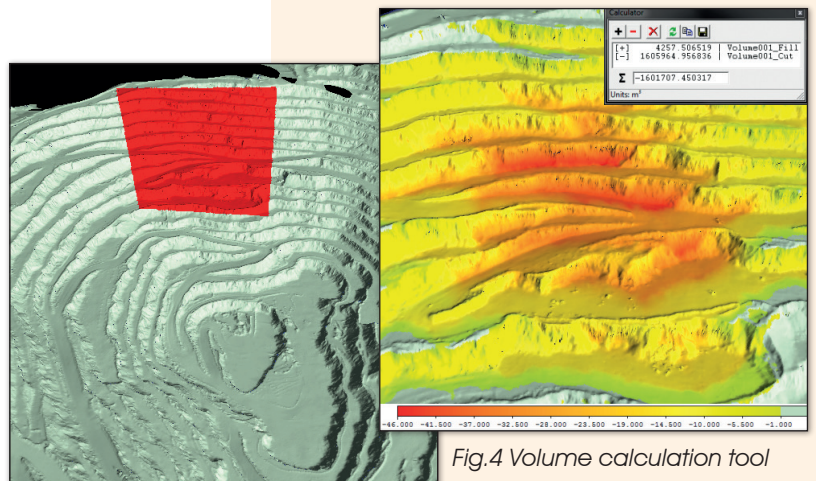


Fig.4 Volume calculation tool

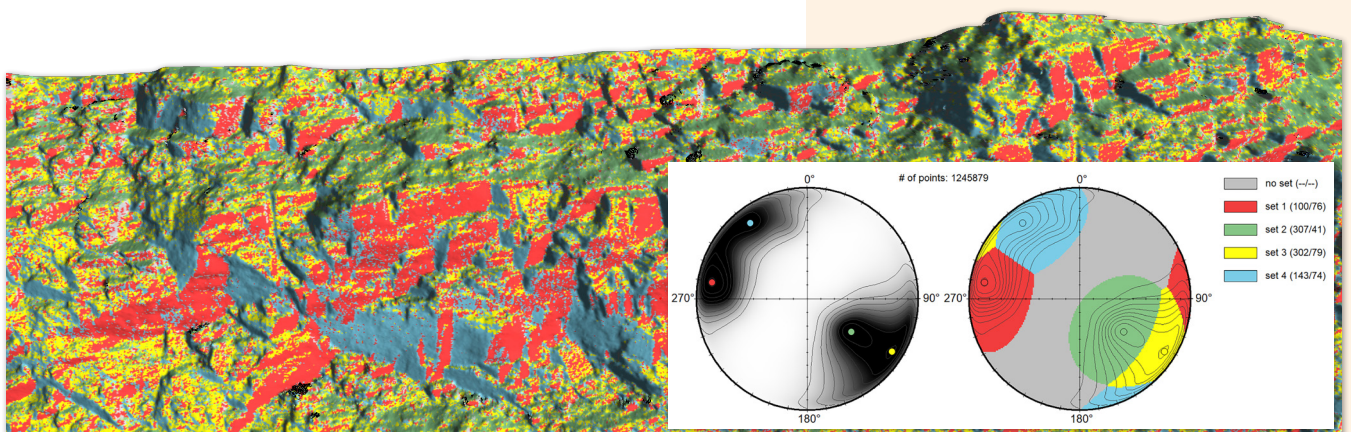


Fig.5 classification results from LIS GeoTec tool

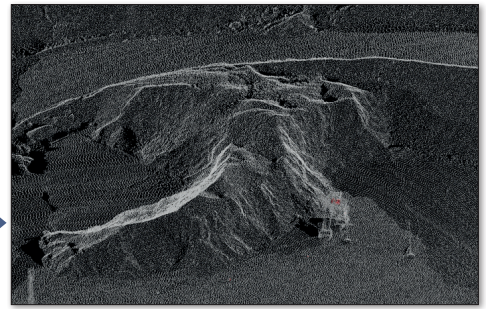
A statistical analysis is performed on dip and dip direction to identify orientation clusters (discontinuity sets). These sets are then visualized on a polar plot. The results can be exported to CSV and PDF.

More information on the Infosheet LIS GeoTec Plugin.

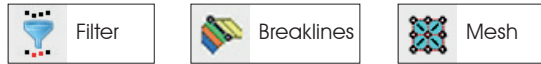
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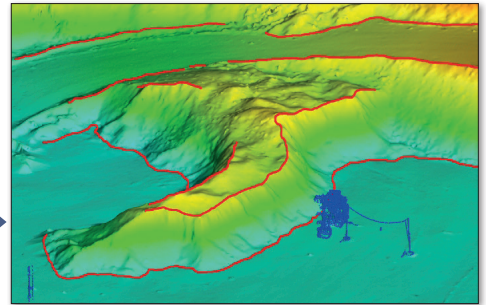
Preprocessing



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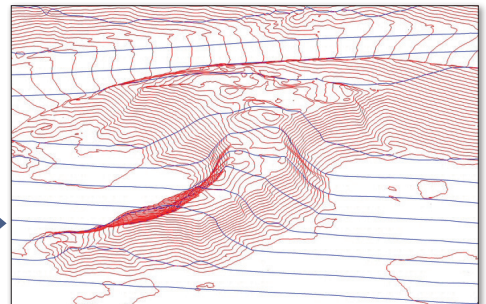
Surface Modeling



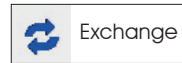
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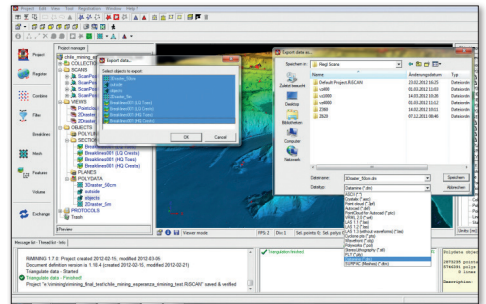
Feature Extraction



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Export



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