RIEGL
LASER MEASUREMENT SYSTEMS

Geotechnical Analysis: Quarry Spitz, Austria

This quarry was scanned in 2005 and 2006, because between these two measurements a big rock-landslide has taken place. The data was used to calculate the exact volume of rock-mass moved by the landslide. Besides the volume-calculation also geotechnical analysis was made on the 3D-data. As input for these geotechnical analysis of endangered areas (by rock falls), dip-angle and –direction of faults, joints and beddings are essential. These parameters mainly determine the mechanical behaviour of rock masses. Normally specialists have to climb up into dangerous areas to measure these values by hand, which is hazardous, difficult, and time-consuming.
RiSCANPRO offers functionality to calculate directly on the 3D-model best-fitting-planes, describing direction and orientation of faults, joints, and beddings. Relevant parameters of extracted planes can be exported for further analysis (e.g. polar-plots) in geotechnical software packages.

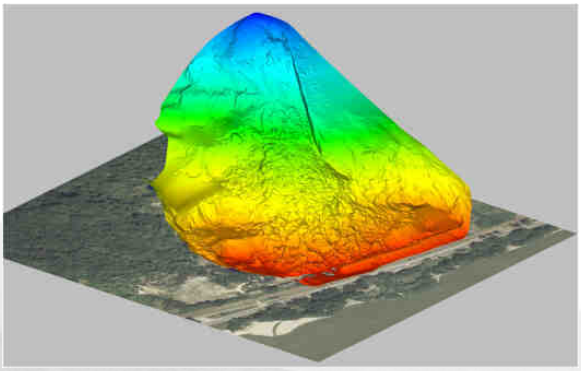
Project Key-Facts:

RIEGL instrument	LMS Z-420i
Object of interest	Quarry Spitz, situated along the Danube, Austria
Results	Mass-balance of landslide, Geotechnical Analysis of the quarry

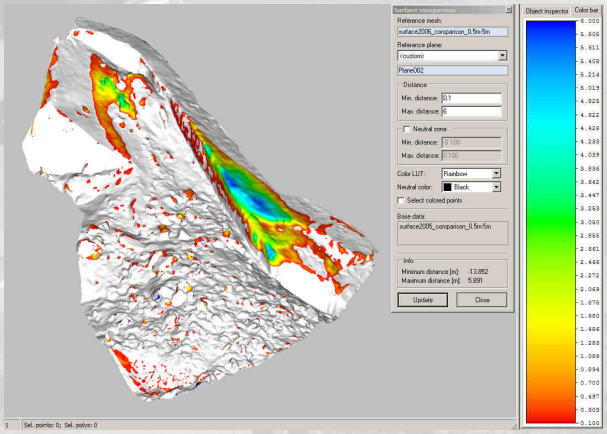
Process Key-Facts for each measurement-campaign:

Number of scan-positions	5
Time needed for data-accquisition	4 hours
Time needed for post processing	3 hours
Acquisition workflow	panorama scan (VxH 80°x360°), registration of scan-data via control-points, measured by Differential GPS
Acquisition platform	Standard Surveying Tripod

Scanner at work:

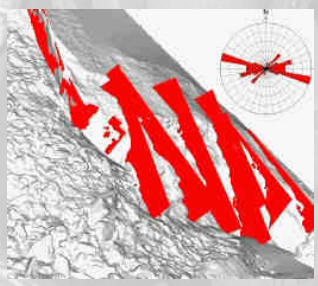


The 3D-modell was calculated from 5 different scan-positions. The final 3D-triangulated model has a resolution of 0.3m to reduce the number of data, which still consists of 1.5 million triangles. Underneath the Aerial-orthophoto of this area is visualized.
To compare the two different situat-ions (before and after the landslide) only the relevant area was scanned in 2006 again.

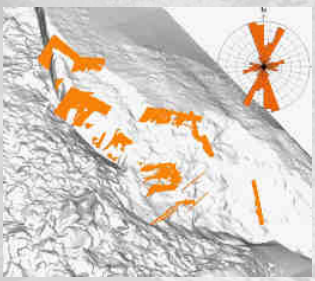


The screen-shot on the left shows the comparison between the two measurement-campaigns, realized using RiSCANPRO. Visualized is the model of 2005, showing the big rock-block of the landslide, which was coming down during the winter-season. The color-bar ranges from 0.1m (red) to 6m (blue). On top of the model a second smaller land-slides is visible, which is in constant movement, because of a wet-zone in this area, causing permanent instability. The bottom-zone of the model, shows some point by point movements, resulting from some movements of single rock-blocks.

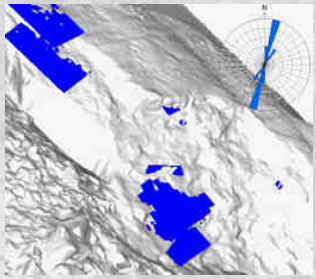
Following images are showing faults, joints, and beddings calculated in RiSCANPRO. By exporting the dip-angle and dip-direction of the calculated planes into special geotechnical software-packages polar-plots can be created, giving the information of stabilities and in-stabilities.



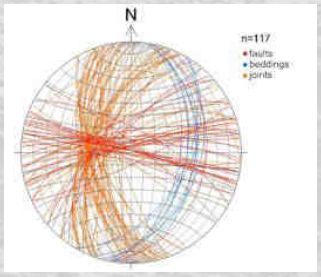
faults



joints



beddings



polar-plot

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