

## **Contact-free measurement of rock mass structures using the JointMetriX3D system**

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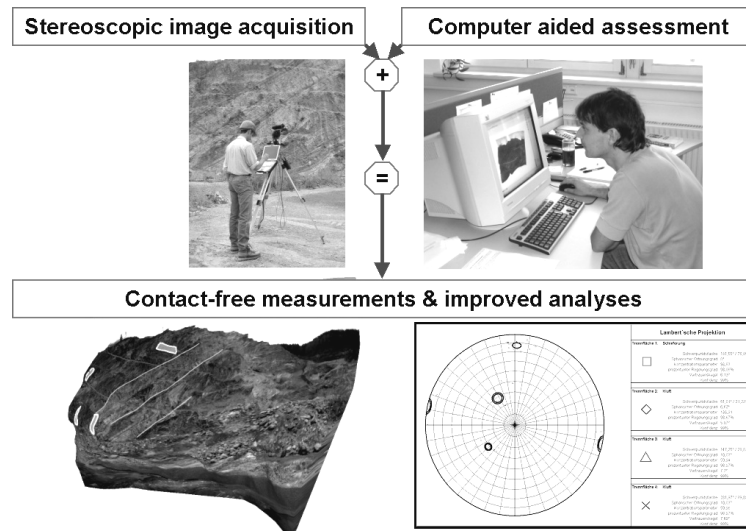
Rock mass characterisation comprises to establish a geometric model of the rock mass including its discontinuity network. The measurement of the discontinuities commonly requires physical contact in order to apply a compass-clinometre device and a tape-measure. As there are regions with difficult or even hazardous access, measurements often cannot be taken as requested. It might also take considerable efforts to get access to all relevant measurement locations which is sometimes problematic or in any case time consuming, thus costly.

JointMetriX3D is a novel system that allows contact-free measurements of rock mass structures. Discontinuity orientations, as well as distances and areas are quantified with it. A digital panoramic camera is used to generate a high resolution 3D image of a rock face. Software tools allow the assessment of the 3D image in order to measure the visible structures (see fig. 1). Photogrammetric principles are applied in order to reference the 3D image to a given object co-ordinate system.

The system delivers a detailed, comprehensive documentation of the actual rock mass conditions and preserves them for later analyses and measurements. The contact-free measuring technique facilitate

work at rock walls with difficult access and cuts data acquisition time. It is useful at different rock faces ranging from 3 to 300 m height. Besides, the detailed 3D images represent an objective data basis that enables also later review or even rock mass assessments off site.

The system was applied in tunnelling, mining, quarrying, as well as stability assessments of slopes or scarps. Combining the resulting information with the block theory showed an interesting application in analysing rock slopes most recently



**Figure 1: JointMetrix3D principle: 3D imaging and geotechnical assessment software enable improved analyses.**

Key words: Discontinuity orientation, rock mass characterisation , stability analysis