

SWITZERLAND, Rotzloch quarry, Stansstad

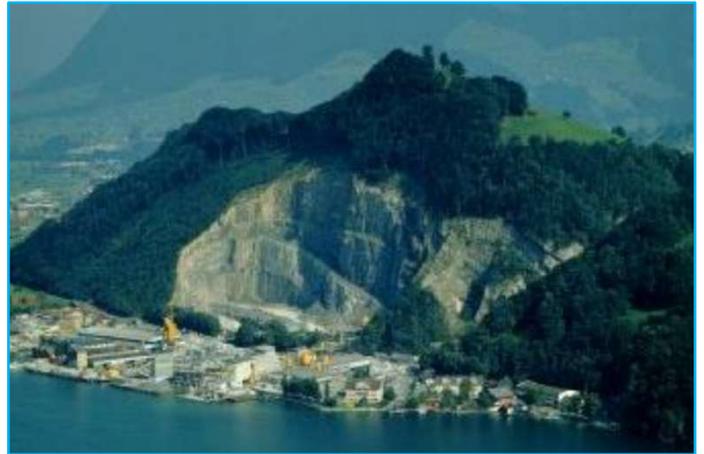
Telejointmeters and a temperature sensor that is operated with the WRLog radio data transmitter network.

THE PROJECT

The displacements of individual critical blocks against the rock face have been measured and monitored at a total of 7 measuring points using manually measured telejoint meters for several years. In order not to endanger the persons entrusted with this work, these measurements were only carried out in good weather conditions. On the one hand, this led to long measurement intervals and periodically to long measurement interruptions of several months. In addition, individual cables that reached the access point at the top of the quarry were damaged by rock fall. In order to optimize the effort for measurement and maintenance as well as the frequency of measurements, the customer, Steinag AG, decided to install and operate, an automatic system with Telejointmeters and a temperature sensor that is operated with the WRLog radio data transmission network.



Anchor load cell



Quarry Rotzloch



Borehole extensometer



Telejointmeter sensor and Tiltmeter



THE SYSTEM

Huggenberger wireless sensor networks, the system essentially consists of the sensors, the nodes, the gateway and the Huggenberger-Monitor data platform.

Different tasks require different sensors:

- Telejointmeter for displacement measurement over individual fissures, convergence extensometer for distances over 1m to approx. 4m and over large distances between widely spaced boulders using laser distance meters
- Water pressure sensors for measuring pore water pressures groundwater levels, which often have a significant impact on rock and ground movements
- Inclinometers are used to detect tilt of rock structures and supporting structures (retaining walls, nail walls, etc.) with high precision.
- Borehole extensometers record shifts in soil and rock over one or more sections in the rock and ground
- Load cells allow monitoring of soil anchors and rock nails.
- Inclinometer measuring chains record and monitor deep sliding movements in vertical and horizontal boreholes.

THE OUTCOME

The WRLog system mainly consists of the following components:

- The nodes are data loggers which transmit the measured values to the gateway using LORA radio. We can assume transmission distances of several kilometers and a battery operating time of several years. This eliminates the need for complex cabling work and the otherwise necessary surge protection.
- The gateway connected to the power supply is the receiver for the nodes and sends the data to an FTP server on the Internet. The data can also be queried via API.



The Huggenberger-Monitor web platform is prepared as a project website and provides the measured values graphically and numerically, can trigger alarms (as SMS or email) and summarizes the entire monitoring information on a password-protected website.

