

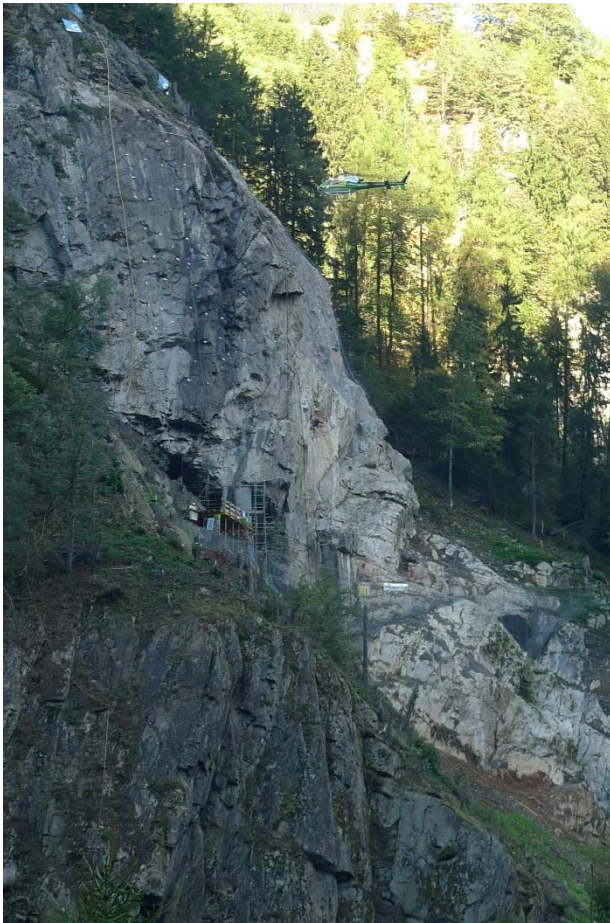


PHYSICAL SECURITY MONITORING OF ENGINEERING STRUCTURES

## **Anchor load measurement with Huggenberger load cells, Wireless data transmission and web data management**

### **General information**

Anchor load measurements for construction pits, support structures, rock wall protection and for other geotechnical structures are, within the safety and operation plan, an essential part of risk control in construction. Anchor load cells are often supplied and installed by the anchor supplier. The specialist company, commissioned with the anchoring work, is often responsible also to carry out the measurements, to evaluate the results and to transmit these to the client and the engineers responsible for the project.



Monitored rock cliff

Huggenberger AG can make a significant contribution to this.

The anchor load cells from Huggenberger AG are available in various capacities. If these are owned by the specialist company, we can periodically check, calibrate and, if necessary, revise them.



Huggenberger Load Cells



Load Cells Calibration

**Manual measurement:**

A reading device, e.g. can be also rented. This enables the anchor forces to be displayed very precisely and directly in kN.



Indipoc MC7

**Automatic measurements with Mini-OmniaLog data logger**

With the Mini-OmniaLog data logger, up to 4 anchor load cells can be automatically measured and recorded, e.g. every 4 hours, and their data is transmitted by the integrated GSM modem. A .csv file is usually saved on an ftp server and is available there for further evaluation.



Mini-OmniaLog Datalogger

### Automatic measurement with the WRLog measuring system

The WRLog measuring system is based on wireless data transmission between the anchor force load cells and a gateway. The load cells are connected to the nodes in groups or individually. The WRLog nodes transmit the measured values over large distances (up to approx. 10 km) with low power consumption (autonomy for several years) to the WRLog gateway.



WRLog 1 channel Pico-Node

4-Channel WRLog-Node

WRLog- Gateway

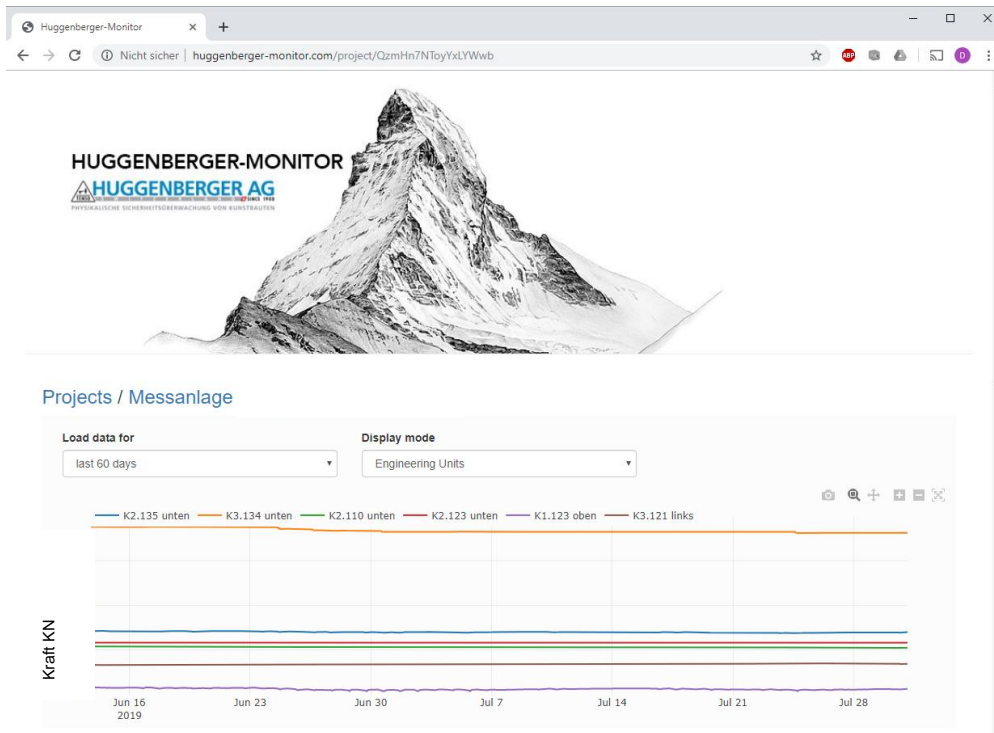
The gateway, which usually includes a GSM SIM card, transmits the measurement results as a .csv file to an ftp server or will release the data via API (Application Programming Interface). With this system, the cabling and the corresponding effort during the construction period for the cable laying and its maintenance on the construction site is minimal. The on-site damage to cables, that often occurs during construction work, can be reduced to a minimum. The gateway is accessed using a browser, e.g. to view the results, to change the measuring frequency and to transmit the data of the anchor force measurement remotely.



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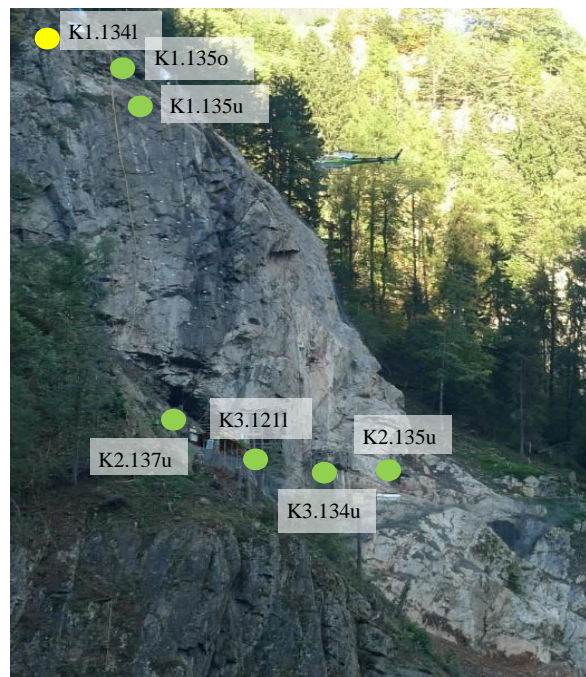
## Data visualization with Huggenberger monitor

The project-specific data platform represents the project and shows the measuring anchors. Various graphic of anchor forces over time, possibly combined with other measurement results, are displayed in the Huggenberger monitor. The colors of the sensor symbols change from green (within attention value) to yellow resp. on red (outside alarm value).



### Sensors

- K1.135 oben
- K2.135 unten
- K3.134 unten
- K4.134 oben
- K1.110 oben
- K2.110 unten
- K2.123 unten
- K1.123 oben
- K3.121 links
- K4.121 rechts
- K1.28 nord
- K1.37 oben
- K2.37 unten
- K1.7 nord
- K2.7 süd
- K1.29 süd
- K2.29 nord
- K3.28 süd





Images and metadata of the relevant measuring points as well as a project logbook can be continuously added and thus offer a comprehensive overview of the monitoring project. Alerting via email or as SMS, when the attention or alarm value is exceeded, are activated and then triggered.