

Leica Geosystems **TruStory**

Monitoring a dam wall in a Polish Copper Ore Enrichment Facility (PL)



View from the monitoring hut towards the tailings dam wall.

In December 2008 the first monitoring project in Poland for the KGHM Polska Miedz SA (Polish Copper) Company was started. Located in western Poland, KGHM Polska Miedz SA (Polish Copper) is the largest company in the region, employing approximately 18000 people. At present it is the 10th largest copper producer in the world.

The tailings dam, Zelazny Most ("Iron Bridge") belongs to the copper ore enrichment facilities, managed by the Hydrotechnical Division. The purpose of this division is to manage the flow of tailings from the three ore enrichment facilities, which process the copper ore using the flotation method. The process of flotation requires the use of large amounts of

water. 4-5 m³/t of enriched ore are sent to flotation and the tailings generated by this process are in the form of a liquid slime. Solids represent 6.5-8.7% of the volume. These tailings are then transported by pipe to the tailings pond.

The tailings dam covers an area of approximately 1400 ha. The total length of the dam wall is 14.3 km long. The project scope involves establishing a continuous, automatic monitoring system for the eastern section of the tailings' dam wall.

Traditionally, the dam wall was monitored using classical surveys techniques involving TPS and distance angular movements. Due to rising geotechnical problems with the dam slopes, such as landslides, the mine operators decided to change technology.

■ Scope

Establishing a continuous, automatic monitoring system for a section of an extremely large dam wall.

■ Customer

KGHM Polska Miedz SA (Polish Copper), Hydrotechnical Department (HD), Rudna (Lubin), Western Poland.

■ Date

December 2008 - Ongoing

■ Location



■ Project Summary

Instruments

Leica GMX902 GG
Leica GRX1200 GG Pro
Leica TCA2003
Leica Nivel210
Leica prisms

Software

Leica GeoMoS
Leica GNSS Spider
Self developed database converter

■ Other

STS meteo sensor

■ Benefits:

- Increased productivity
- Safety control
- Increased data analysis
- Data modeling for scientific purposes
- Cost savings

After a very detailed and thorough analysis, the mine operators choose Leica Geosystems automatic monitoring system, GeoMoS. The Hydrotechnical Department is very demanding and strongly relies on international experts' opinions. All their specialists recognize Leica Geosystems and believe it's a synonym of precision, high quality and robustness.

Leica Monitoring Solution

Initially in 2008, a 2 km section of the dam wall would be monitored with a Leica TCA2003 total station and approx. 30 Leica prisms. The monitored area of the dam wall is subdivided into different sections based on the expected movements. In general the operator expects around 0.05 meter movement per year.



New Reference Station outside of the movement area.

For an independent coordinate check of the Leica TCA2003 total station and their stable reference prisms, a GNSS reference station is built outside of the monitoring area and two GNSS GMX902GG receivers and antennas are installed inside the expected deformation area. One of these GNSS receiver/

antenna is co-located with a prism for the reference and orientation of the TCA2003 total station. The second is co-located at the top measurement hut with the total station to get absolute coordinates of the total station inside the unstable area.

Leica GNSS Spider provides the GNSS receiver control and real-time data collection. The GNSS raw data is collected every 6 hours per baseline (one from the reference station outside to the co-located prism and one to the co-located total station). A highly precise Spider Post Processing Product is created.

The TCA2003 total station is controlled via Leica GeoMoS Monitor, which also retrieves the GNSS base-line results. All the data is combined and stored to the open GeoMoS SQL database. The KGHM monitoring department is in charge of the automatic monitoring systems and reacts to limit messages.

Based on the requirements of KGHM, specially designed software retrieves with SQL statements the computed GeoMoS displacements and transfers them to another especially developed software. This software provides the very specific graphical representation for international experts on slope stability and open pit mining.

The communication of all instruments is established using LAN and WiFi networks.

Benefits

The Leica Monitoring Solution with integration geological software (SyZeM) has been a major improvement in productivity and data analysis of the stability of the slope monitoring in comparison with the previous manual survey. The prediction of slope failures can be done in real-time and the safety is improved.

In addition the GNSS reference station is not only used as a stable reference point for the monitoring system. It is also used to broadcast RTK corrections as a commercial service. The local land surveyors that use these corrections provide additional income to the mine.



Monitoring hut antenna

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- when it has to be **right**

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