

Aitik mine monitors pore pressures remotely

COUNTRY

SWEDEN

PROJECT TYPE

UNDERGROUND WATER TABLE MONITORING

SECTOR

MINING

MAIN PRODUCT

LOADSENSING

Challenge

Aitik, situated outside the town of Gällivare in the north of Sweden, is Sweden's largest copper mine. Vast quantities of rock are mined and transported around the clock every day at Aitik's open pit. The deposit consists of chalcopyrite and pyrite-yielding copper, gold and silver. Pore pressures around the open pit are a crucial parameter for the pumping strategy as well as for the stability of the slopes. And the mining operator needs to monitor wet production areas to create dewatering plans to optimize the copper ore extraction process.

In 2010, Boliden, the mine operator, started controlling pore pressure by means of 120 piezometers installed in 40 boreholes in and around the open pit. Initially, the mine obtained the piezometric data manually, but later started using a standalone system to gather data automatically and collect it on a monthly basis. The disadvantage of this process was that mining operations were not updated with the latest information on water behavior in the pit. Boliden had to rely on monthly feedback, prone to human error. And this manual data gathering was time and labor consuming, and implied additional risks for workers' safety.

Solution

Boliden realized it would be better to use a remotely operated monitoring system with real-time control over the piezometers. The distances between the boreholes and the vast extension of the mine, combined with vehicle traffic and the changing environment around the pit, made a wireless monitoring system the ideal solution.

In July 2016, the mine implemented a long-range, low-power wireless monitoring system for eight vibrating piezometers. Data was gathered by wireless nodes next to the boreholes, which sent information to the mine communication tower 1.4 kilometers away from the furthest borehole. At the communication tower, a gateway received all the piezometer data and transmitted it to a server hosting data management software.

Boliden has subsequently installed 41 Loadsensing wireless data units which monitor pore water pressure, measured by the piezometers, and send data automatically and wirelessly to Loadsensing's CMT Edge software every hour. Pore water pressure can be surveyed easily in real-time via a web browser. The whole system is controlled with just one Loadsensing gateway, located on the mine communication tower almost a mile away from the boreholes. The wireless units are kept securely inside wooden boxes at the boreholes around the pit.

Benefits

The Loadsensing wireless monitoring system enables automatic remote data gathering on a daily basis, improving the quality and frequency of critical information available to Boliden. The mining operator uses this to optimize copper production. In addition, there is no need for manual operations, saving labor and creating a safer mining environment. The Loadsensing system was selected due to its long-range radio communications, low power consumption, easy implementation and strong worldwide references. Its robust design is engineered for tough conditions in the most challenging environments, which makes it a perfect fit for the Aitik open pit mine.

Advantages

- Improved mine production from more timely and accurate ground condition information
- Enhanced personnel safety through automatic remote gathering of pore pressure data
- Reduced cost from not having to carry out manual measurements



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1 - Loadsensing VW 5 channel data logger

2 - Open pit of Boliden Aitik, Sweden's largest copper mine