

Volakas Quarry – Open Pit and Underground Mine Monitoring

CLIENTS: LANDMARK, F.H.L. KIRIAKIDIS GROUP

How wireless monitoring improved asset management and safety at one of the world's largest white marble mines

Challenge

The F.H.L. KIRIAKIDIS Group is one of the world's leading marble and granite quarrying and trading companies. They own several quarries throughout Greece and specialise in the supply of white marble. Some of their notable projects include the Grand Mosque of Abu Dhabi and the National Parliament of Uzbekistan.

One of the company's largest sites - the Volakas quarry, located in the Macedonia Region of Greece, supplies nearly 250,000 tons of marble blocks a year. The marble is extracted via open-pit and underground mines - through tunnel excavation - before it is sent on for further processing.

The extensive mining taking place at Volakas requires structural and geotechnical monitoring to provide crucial data about the site. Above ground, the stability of the slopes, and below ground, the profile of the tunnels (convergence and divergence) must be measured to ensure the safety of the site.



Traditional methods of monitoring, including manual data gathering and the collection of data from separate systems were originally used at the site, but proved to be time consuming, costly, and inadequate to meet the needs of a growing mining site. It was therefore necessary to find a monitoring system that was flexible, extremely accurate, unobtrusive, reliable, and easy to install.





Solution

Because of the size and complexity of the site, including the significant distance between monitoring locations, Senceive's Greek distributor Landmark recommended Senceive's GeoWAN™ monitoring communication platform - a long-range, low power, remote wireless system. The platform is based on industry-standard LoRaWAN technology and is capable of long-range transmission through physical obstructions, with sensors able to communicate with a Gateway at a distance as great as 15 km.

Landmark installed two types of Senceive wireless sensor nodes - combined Optical Displacement Sensor (ODS) and Triaxial Tilt Sensor nodes, and Crack Sensor Nodes, throughout the site. Despite the challenging nature of this large site, the installation proved to be quick and simple, both above and below ground. The Gateway was installed in a place where there was 4G coverage, several hundred meters away from all the sensors. Once installed, the system was operational within a few minutes, with data being collected from the sensors and sent to cloud-based visualisation software WebMonitor™, via the Gateway.

The wireless system enabled automatic and continuous data gathering. High precision data is now continuously transmitted to WebMonitor, where stakeholders can remotely check the ground and structural conditions of the site.



Outcome

The wireless system enabled automatic and continuous remote data gathering. High precision data is now continuously transmitted from the sensors to WebMonitor™, where stakeholders can remotely check the ground and structural conditions of the site. The system was configured to send SMS and email alerts to stakeholders in the event of any movements outside pre-set threshold levels. The technology is reliable and robust and requires only minimal maintenance - which reduces the need for visual inspection checks, thus saving time and improving safety.

The system enables users to set specific tolerances and time triggers suitable for each sensor and/or area. Another powerful advantage of the technology, in addition to its great flexibility, is its expandability. Additional sensors may be added to the network as required. This means that the monitoring system can be moved and expanded as the focus of activity moves around the mine site.

