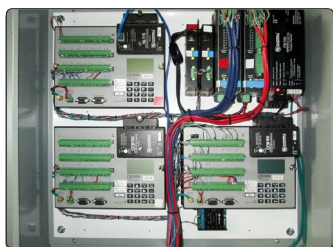


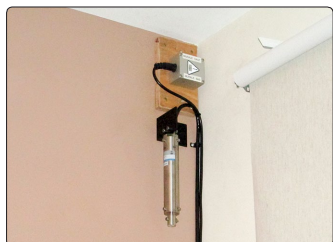
Blasting effects, Malartic Mine, Québec



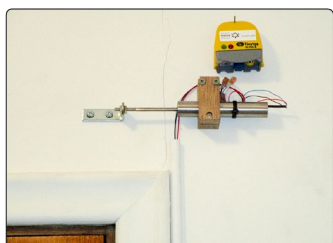
◆ Dynamic data acquisition system



◆ Geokon 4420 crackmeter installed on basement foundation



◆ Tiltmeter MEMS 6160 and geophone installed at ceiling height



◆ LVDT displacement transducer installed above door frame



Open pit mine view

The effects of blasting have always been of significant concern to both mine owners and residents in the mining region because of the potential impacts such activities may have on private properties. As such, GKM Consultants was requested to design and develop an instrumentation system that could monitor both static and dynamic effects on residential dwellings during blasting. The affected residential sector is located near an open pit mine and is exposed to recurrent mine blasting operations.

To supplement existing ground vibration and air-blast overpressure monitors, GKM supplied and installed Geokon vibrating wire crackmeters, MEMS tiltmeters and LVDT displacement sensors to monitor structural movements and crack openings. The system has been set up to monitor four residences, recording angular rotation of the structure and displacements to an accuracy of ± 5 arcsec and up to $4 \mu\text{m}$ respectively.

The automated data acquisition system (ADAS) custom-made for this project consists mainly of Campbell Scientific CR-3000 Dataloggers, CDM-VW305 dynamic vibrating wire analyzers and NLI 15 ethernet interfaces. The CDM-VW305 device is designed to measure standard single-coil vibrating wire sensors in dynamic mode at rates of 20 to 333 Hz. The NLI 15 ethernet interface allows the CR-3000 datalogger to communicate over the mine owner's local network and expands the datalogger data storage capacity.

Dynamic measurements are collected from the vibrating wire and LVDT sensors during each blast at rates of 100 and 250 Hz respectively, while static measurements are collected from all sensors every twelve hours. Geophones are used to automatically trigger the dataloggers to allow for the collection of dynamic measurements during each blast for a 30 second period, effectively reducing data storage requirements and easing data treatment and analysis.

The data collected during blasting events was aligned with the GKM system goals and confirmed the viability of using standard single-coil vibrating wire sensors for the collection of dynamic measurements with frequencies of up to 100 Hz.

GKM Consultants is proud to have been a partner in developing an instrumentation system that accurately monitors the blasting effects on neighbouring residences, which enhanced previous studies with new measurements.