

# Cave Tracker

## Real-time measurement of fragmented rock and its flow in underground block caving

### Challenge

Block caving relies on fragmentation and forces of gravity to 'cave' an underground orebody to draw points, from where it is collected and taken away for processing.

Monitoring the flow of the caved ore was only possible once markers, embedded in the orebody, exited at the draw points at the bottom. This method is limited as the exact path of the ore cannot be tracked as it moves around inside the cave. Being able to model the best route for the ore to flow and modifying the draw strategy in real-time would substantially reduce waste and avoid significant loss of value.

Several monitoring methods have been developed which attempt to provide greater insight into the cave's extent. These include time domain reflectometer, extensometers and seismic systems.

Each of these monitoring tools have limitations and, in isolation, is unable to provide the broad ranging data required to have a comprehensive 3D view of the extent of the cave.

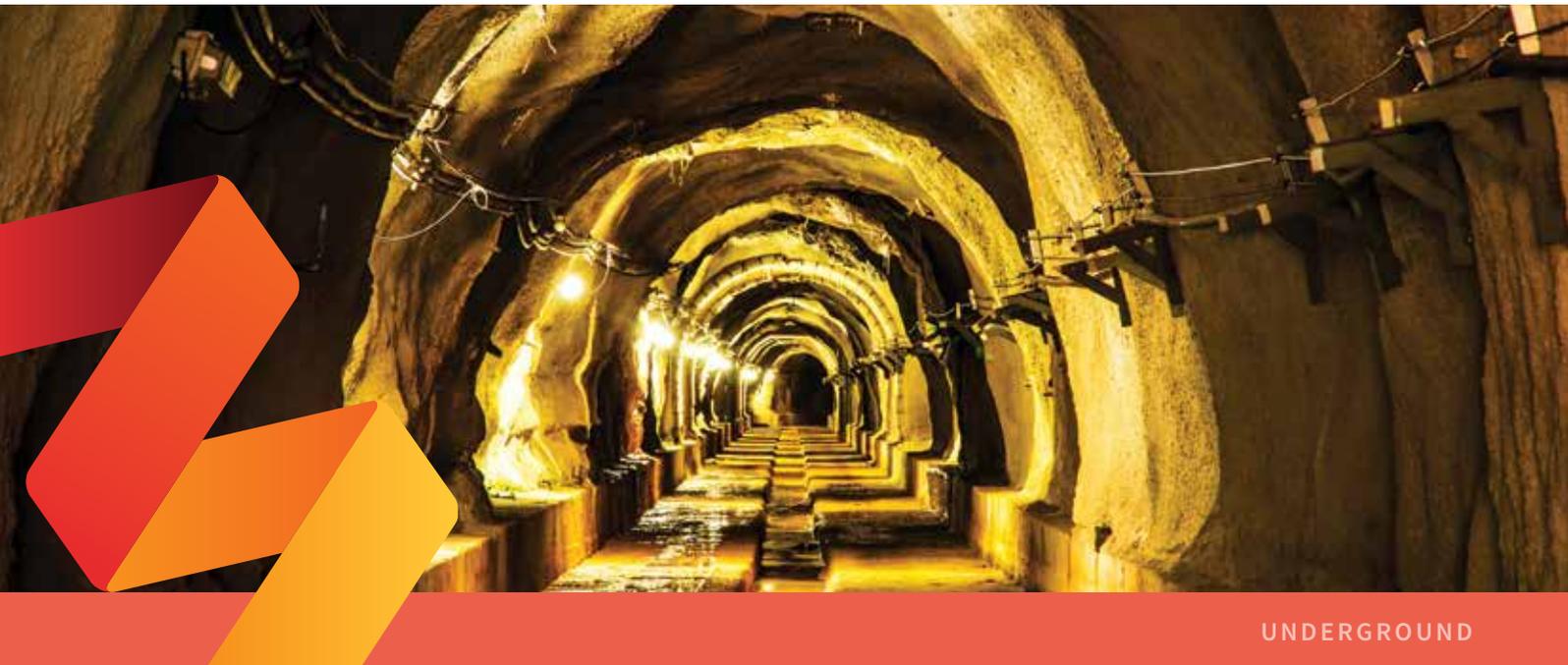
### Solution

The Cave Tracker system, developed by Mining3, Newcrest Mining, Rio Tinto and Elexon, uses magnetic beacons embedded in the orebody which are spun at a particular speed to generate a magnetic field.

It eliminates the need for battery power and can be detected from over 200m away through broken rock. The beacon signals are then picked up by detectors surrounding the orebody.

The detectors feed the signals into a central cave tracking unit which collects measurements to determine the 3D location as it moves in real time. The ability to track beacon movement allows mine engineers to determine which parts of the cave are moving and which parts are not.

The technology not only delivers significant productivity improvements but has the potential to increase the safety of cave mining by detecting the formation of air gaps and managing them before they pose a threat.



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## How it works

The Cave Tracker system consists of the following components:

**Beacon:** Cylindrical fibreglass enclosure containing a strong magnet, batteries and electronic circuitry.

**Detector:** Strategically placed throughout the mine so the system can detect the 3D positions of beacons.

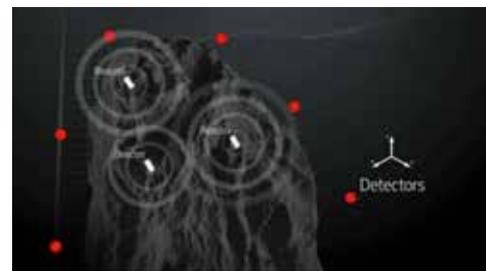
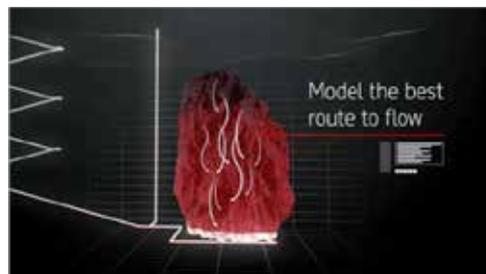
**Communication adapter module (ITCAM):** Provides a DC power and serial data communication link for detectors and beacons.

**Cave Tracker Management System (CTMS):** The CTMS is responsible for data storage of detector range readings, converting received detector ranges into 3D beacon positions and managing installed Cave Tracker System Devices.

A small ruggedised laptop + USB activation wand for system commissioning and wireless activation of beacons before installation.

## Benefits

- Real-time material movement mapping
- Improved process control and mine planning
- Maximised recovery
- Reduced risks and uncertainties
- Minimised dilution
- Enhanced safety



## Status

The Cave Tracker system is commercially available from Elexon Mining, a commercial partner of Mining3. Contact Elexon direct on +61 7 3205 8450 or go to [www.elexonmining.com](http://www.elexonmining.com).

### About Mining3

Mining3 is the world's leading research organisation, directed by its global mining industry members to develop and deliver transformational technology to improve productivity, sustainability and safety.

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