

Backfill slope and caving monitoring

Nickel West is the world's third largest producer of nickel in concentrate, providing 16 percent of global production. Nickel West's operations in Western Australia include concentrators at Mt Keith, Leinster and Kambalda, the Kalgoorlie smelter and the Kwinana refinery.



HIGHLIGHTS

- Laser scanning is fast, safe and accurate
- Ideal in areas where access may be difficult
- Minimal interruption to equipment operations
- Scanning of the entire pit in less than one hour

Leinster Nickel Operation (LNO), 645 km northeast of Perth, began production in 1979. Concentrate produced at Leinster and the nearby Mt Keith Operation is dried at Leinster and transported to the Kalgoorlie smelter. Leinster has a total underground mineral resource of 34.3 million tonnes grading 2.3 percent nickel, and 156 million tonnes open cut grading 0.6 percent nickel.

The Maptek I-Site™ 3D laser imaging system was first used at Mt Keith for stockpile calculations and modelling pit topography, and then for monitoring material movement at Leinster's operations.

Laser scanning is a particularly useful tool for 3D visualisation and volume calculations. Fast, safe and accurate, it can be used in areas where access might otherwise be impossible, with minimal interruption to equipment operation.

At the LNO Perseverance open pit, the unstable pit crest requires an exclusion zone of 30 metres, meaning there is no access to the edge whatsoever.

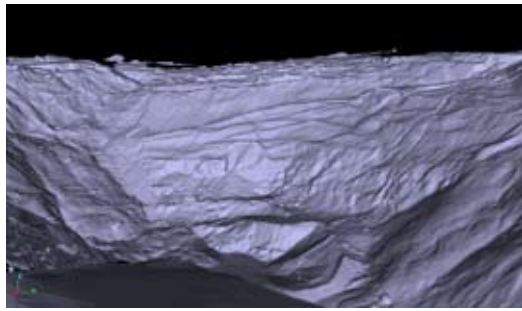
The benefits of the I-Site laser scanner are obvious here. Setting up from safe positions, the entire pit can be scanned using only two setups, the whole process taking less than one hour.

The I-Site imaging system can scan an entire pit using only two setups.

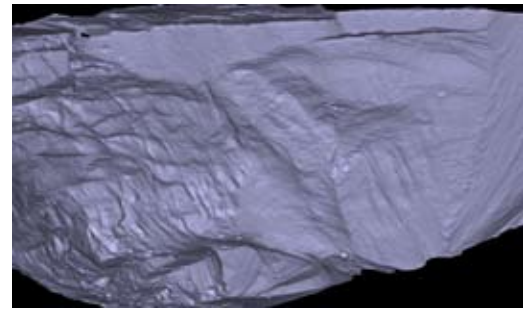
The only other feasible survey method is to use a reflectorless instrument which collects around 100 points in an hour, compared to the I-Site laser scanner's 4400 points per second.

At this site the first scan was in the north-east corner closest to the area where the backfill is being placed, to ensure that as much data as possible is captured in the area of interest.

The second setup position was at the end of a ramp that was cut off by a slip in the pit wall. This central scanning position allows the majority of the pit to be surveyed in a single scan.



Southern extent showing caving into underground



Cut away view of backfill captured from first location

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Monitoring of Perseverance pit with the I-Site scanner began in January 2006.

After the backfilling operation concluded at the end of that year, the I-Site 4400 laser scanner continued to be used on an ongoing basis to provide safe, detailed monitoring of any pit wall movement.

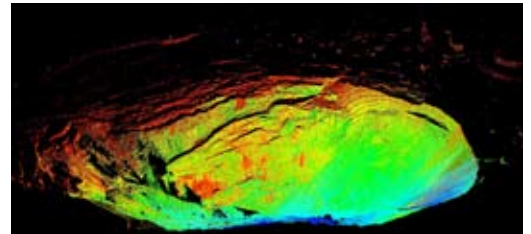
The result is a detailed triangulation of the backfilling operation, used to identify possible hang-ups in the material being dumped as well as areas where further fill material is needed. This allows for safe and efficient placement of backfill into the pit, with the smallest possible exposure of backfill failure for the operators.

The triangulation model is also used for calculating the amount of material that has been placed into the pit as a cross-check against a standard survey pickup. In addition it is used for monitoring of the southern extent of the pit to track the movement of the pit wall as it is subsiding into the underground operations.

Monitoring of the Perseverance pit has been ongoing since January 2006. Most areas have been scanned weekly.

Regular information about the backfill is collected in a timely manner and appropriate management decisions can be made as a result.

The backfilling operation concluded in 2006. After this time, the I-Site 4400 laser scanner was used on an ongoing basis to provide safe, detailed monitoring of any pit wall movement over the longer term.



Raw scan data of backfill captured from first location



Second set up at end of ramp cut off by wall failure