Maptek™ trend analysis for surface movement

The new Maptek™ Sentry system provides intuitive visualisation and trend analysis tools, enabling better understanding of surface movements within mines.

Hillgrove Resources Limited Kanmantoo Copper Mine is a 10-year open cut mine producing 20,000 tpa of copper metal with associated gold and silver. The mine, in the Adelaide Hills of South Australia, has been trialling Maptek™ Sentry since late 2013.

Sentry setup

Sentry is a reliable laser-based system for accurately detecting change in real time. The Maptek™ I-Site™ 8820 laser scanner was positioned on a permanent bollard in a newly opened pit, approximately 200m from a wall of concern. Weekly scans were taken to build up baseline data.

Results were compared to the output from regularly monitored prisms. Sentry data correlated well, and supplied extra information on the surrounding areas. This correlation instilled trust in Sentry, and the additional data assisted with decisions such as remedial stabilisation berm positioning. Based on prism data alone, the stabilisation berm would have been considerably shorter.

When slow creep movement was detected in the highwall, the I-Site laser scanner was repositioned to be more perpendicular to that portion of the wall. A radar was deployed at the same time to specifically cover the area.

Sentry results provided excellent correlation with radar systems. Movement trends in ductile rock were tracked with millimetre accuracy.

Although the radar collected more frequent data (5 minutes versus 42 minutes) the I-Site scan showed similar total movement (3-7mm) and movement rates (<1mm/day).

More recently the rate of highwall movements has increased. Although the laser scanner resolution has been reduced to greatly increase the monitoring frequency to 4 minutes, the scanner and radar data continue to follow similar trends.

During the recent laser scanning period, additional movements were detected below the main ramp into the pit. The combined data from the radar and I-Site scanner were used to manage mine production and establish a second stabilisation berm under the ramp.

Trial results

Maptek returned regularly to Kanmantoo Mine to compare results as changes were detected.

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Sentry showed the points of origin and landing, as well as the volume (down to 0.5-1.5m^3) of small rockfalls. This data has been invaluable for improving Hillgrove's rockfall database, which management uses to reduce small-scale rockfall risk in the vicinity of highwall toes.

With regard to larger wall movements, being able to view data in 2D and 3D with images and heat maps overlaid improves analysis of movements over time.

Sentry's graphical and statistical reporting tools promoted better understanding of the failure mechanisms of several wall movements – the slowly progressing highwall toppling, a weathered slump failure and the slumping under a haul ramp.

The failure timelines from these areas also allowed information to be fed back into the system for creating radar alarms.

Value adding

Laser scan data can also be used for other spatial, geotechnical and volumetric tasks. Design conformance reporting can be conducted in Maptek™ PerfectDig™. Sentry can be halted temporarily so that the laser scanner can be used elsewhere in the operation for survey or geotechnical work.

Hillgrove found that Sentry data improved awareness of movement in the pit and helped plan remedial action. The Hillgrove trial demonstrated Sentry's value for visualising and analysing movement trends and meeting safety objectives.

Thanks to
Hillgrove Resources Limited