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Mine Rockfall and Rock Wall Failures – Proven digital laser-based approach for monitoring slopes at the Kanmantoo Copper Mine

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ABSTRACT

An extensive trial of laser-based survey and monitoring systems at Hillgrove Resources Kanmantoo Copper Mine in the Adelaide Hills, South Australia, has proved the capabilities of the system in monitoring rock movements on open pit walls. Initially, the trial involved deploying a Maptek I-Site 8820 laser scanner and the proof-of-concept Sentry software in the Nugent Pit to monitor ductile rock movements located up to 260m away. The system was proven to be capable of monitoring various rock movements from 1.5 tonne rockfalls up to a 40m high toppling wall failure. Data collected from smaller rockfalls was used to help build a database for Hillgrove's rockfall management program.

As part of the trial, the laser scanner was deployed to monitor a ramp movement event, as well as the toppling failure, adjacent to a slope stability radar. Both devices monitored the slump and the slowly developing toppling movements, with similar results. Although the radar was used as the successful "critical alarm" device for the toppling failure, post-failure analysis showed the laser-based system to be capable of performing a similar role in the ductile rock regime; albeit over much shorter distances than the radar capability. A second laser scanner was deployed into Kanmantoo's Emily Pit in early December 2014, where it successfully provided critical alarm warnings for a block topple event.

Sentry software, which takes advantage of I-Site 3D spatial imaging technology, was first released in November 2014 to meet industry demand for a cost effective, flexible system to detect movement. Sentry has now been re-launched as a fully transportable monitoring system. Deployed in a custom trailer, the system offers a power and communications module, cellular and wifi networking, a dedicated, stable bollard for an I-Site laser scanner and Sentry software.

This presentation will present rock wall movement data from the Sentry trial and a subsequent two years of monitoring of the open pit walls at the Kanmantoo Copper Mine, at distances out to 750m. In addition examples of remote geological mapping and small rockfall detection, using the laser scans, will be described. The Sentry system has proven to be beneficial for the continual improvement of slope monitoring and risk management at hard rock mines.