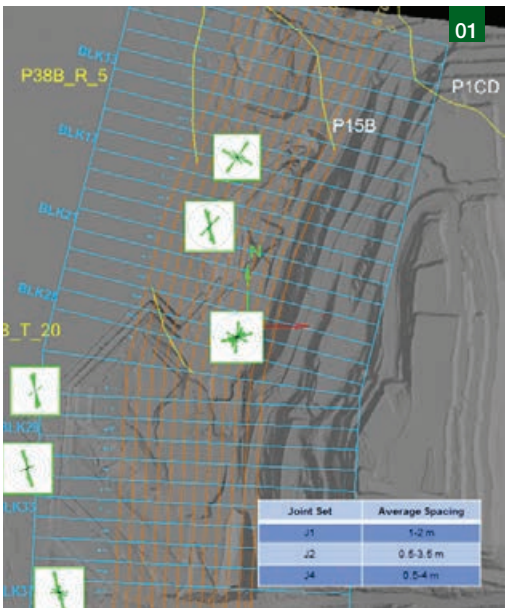
MAPTEK™ I-Site™

Geotechnical studies at AA coal

Geotechnical engineering teams at Anglo American coal sites in Australia use Maptek™ I-Site™ for highwall mapping, reconciliation and drill & blast planning.



Australia's largest exporter of metallurgical coal, Anglo American has 6 operations in Queensland and New South Wales.

The survey team at the Capcoal operation in Queensland's Bowen Basin starting using the Maptek™ I-Site™ 8800 laser scanner in 2011. Geotechnical engineers recognised the potential benefits of the technology and quickly adopted the Maptek™ I-Site Studio™ geotechnical module.

I-Site is now an intrinsic part of the geotechnical workflow, with scans taken every few days across the sites for use in:

- Highwall mapping - structural definition for kinematic analysis
- Reconciliation - plans to actual
- Drill & blast - optimise initiation direction and pattern spacing
- Material strength definition - analyse cause of failures

Highwall mapping

Surveyors can set up the scanner outside the highwall drop zone and safely capture high resolution photographs and detailed data for structure and joint delineation.

Geotechnical engineers no longer need to use hand compasses and photogrammetry for structural data acquisition. I-Site Studio software is employed for mapping structures and kinematic analysis of proposed mine designs.

I-Site Studio is ideal for completing sensitivity analysis, which can justify the need to lower batter angles to reduce risk.

Reconciliation

Geotechnical engineers routinely check excavated slopes against planned designs. I-Site tools add value to this process.

For example, a 60 degree hardwall was planned for a particular block. Comparing design to actual with I-Site cross-section tools demonstrated that historically, mining through weathered Tertiary in this block could achieve an angle of 35 degrees at best, and designs needed to be modified going forward.

In another case, the plan was to dig to 65 metres. I-Site scans showed that failures were appearing when digging at 25 to 30 metres below the surface. Comparing design against actual, the geotechnical advice was to adjust the plans!

PLANNING AND OPERATIONS DEPARTMENTS NOW GET FEEDBACK IN REAL TIME ON HOW THE PIT IS PERFORMING TO DESIGN AND ADVICE ON HOW TO REDUCE RISK.

Drill & blast planning

Joints mapped from I-Site 8800 scans can be plotted onto rose diagrams. This data is used by drill & blast engineers to optimise the initiation direction for minimising in situ highwall damage and reducing energy loss.

Structural data derived from scans can also be used to optimise pattern spacing and burden to achieve the desired fragmentation.

The I-Site scanner is used to measure floor disruption where dragline pits with steeply dipping strata and/or weak floor require blasting. Accurate locations of floor disruption are required to maximise dump stability in subsequent pits.

The scanner is set up on the low wall to capture a broad scan of the pit and the survey positions are used to create design files to reconcile shot effectiveness.

Landform modelling

A particularly useful feature of I-Site Studio is its ability to import dxf and dwg files. Geotechnical engineers are able to selectively trace design geometry off range diagrams for importing into slope stability modelling programs.

I-Site has replaced more time consuming methods using a ruler and protractor to extract coordinates, significantly reducing modelling time.

USING I-SITE TECHNOLOGY HAS SPED UP GEOTECHNICAL DATA CAPTURE AND REDUCED PROCESSING TIME COMPARED TO OTHER HIGHWALL MAPPING TECHNIQUES. GEOTECHNICAL ENGINEERS CAN SPEND MORE TIME IN THE FIELD, WHERE THEIR EXPERTISE CAN ADD VALUE.

Material strengths

I-Site Studio is used to back-analyse failures to better understand material properties. Before and after geometry can be modelled to determine failure plane location for use in failure back-analysis.

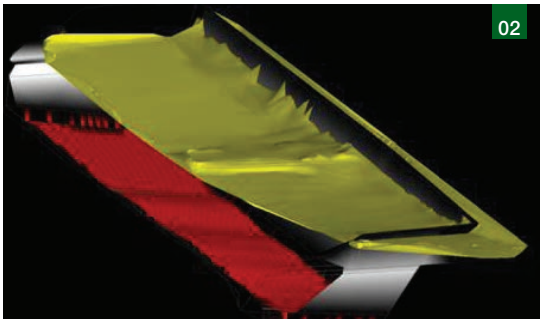
Summary

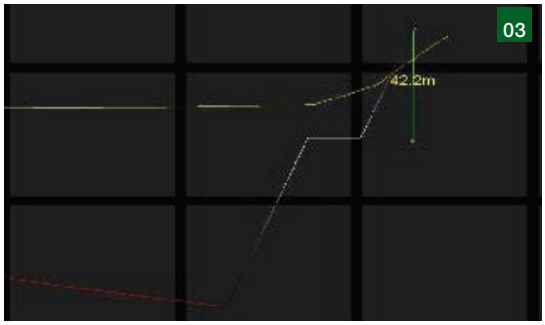
I-Site 8800 laser scanning has provided fast data capture and processing, improving productivity for highwall mapping and slope studies.

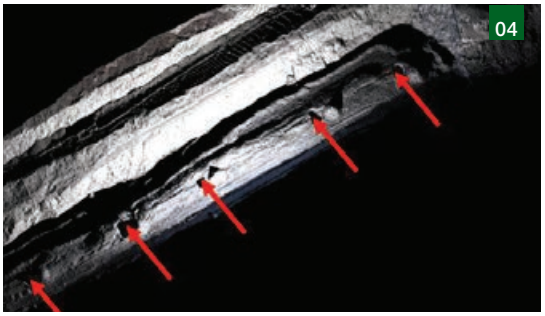
I-Site Studio has dramatically streamlined reconciliation of designs, optimised the drill & blast process, and increased understanding of material strengths. The software is a core tool for all geotechnical engineers at Anglo American coal mines in Australia.

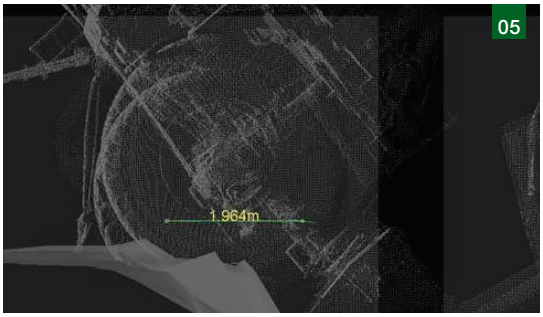
Thanks to Alison McQuillan, Geotechnical Engineer, Anglo American Coal

Extract from paper presented at Maptek Users Conference, Brisbane, 2013









01 Joint persistence and spacing data helps guide drill & blast
02 Modelled data from laser scan showing bench failure
03 Cross-section tools aid reconciliation to design
04 Capturing shot trench data for assessing shot effectiveness
05 Back-analysing failures improves understanding of material properties

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