MAPTEK™ I-Site™

CASE STUDY

Accurate volumes for cost-efficient overburden removal

Topographic scanning with Maptek I-Site™ streamlines stripping.
Rio Tinto Alcan is a supplier of bauxite, alumina and primary aluminium to domestic and export markets.

HIGHLIGHTS

- Accurate volumetric analysis of pre- and post-trial surfaces
- Scans at regular intervals provided detail for modelling
- Survey time halved
- Areas of change easily identified

Rio Tinto Alcan also produces specialty aluminas for advanced ceramics and fire retardants as well as anodes and technology solutions for aluminium smelting.

Alcan recently trialled a new method for overburden removal at the Gove operation in Australia's Northern Territory. An accurate volumetric analysis of the pre- and post-trial surfaces was required to test the validity of the method.

Measuring and generating accurate volumes is a routine task, easily handled by the Maptek I-Site™ 3D laser scanner.

Currently, overburden is removed by scraper and bulldozer. This method assumes that the bauxite deposit is fairly consistent topographically.

The consequence of variation is that large volumes of contaminant material could be sent to the processing plant.

This adds substantially to the cost of the operation, firstly in conveying the waste material and decreasing the efficiency of the refinery, but most significantly in the cost of extracting the waste silica material before processing.

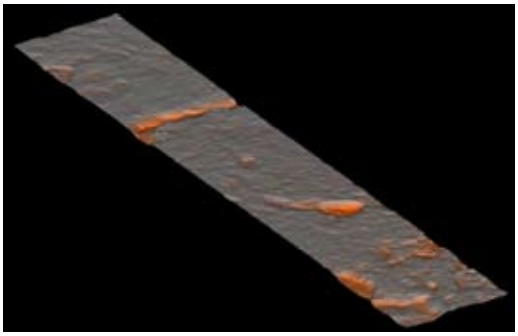
Four trial areas of about 4,000 square metres each were excavated after the normal stripping process. Maptek staff surveyed the site with the I-Site 4400LR laser scanner before and after excavation.

Using the I-Site 4400LR to survey the site before and after stripping the overburden reduced the scanning time from 1 week to 3 days - a saving of 40%.

Scans were conducted at regular intervals to give a point separation of 200 mm, which provided sufficient detail for modelling.

One day was allocated to scan the 4 areas prior to excavation, and 2 days to scan the irregular final surface.

Overburden removal uncovered hidden anomalies, such as an old drainage line



Modelled scan data for one of the Alcan Gove trial areas, transverse ridge indicates an old drainage line

TESTIMONIAL

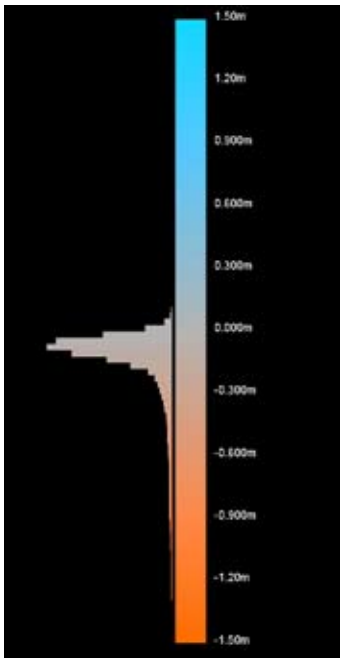
The I-Site trial proved to be a great success, with significant cost savings identified.

Surveying using conventional methods would have taken at least a week. The trial areas were relatively flat before excavation, and highly irregular afterward.

The I-Site 4400LR measures points in a fixed angular grid, so to obtain ground points at the fine resolution required, the scanner was mounted on a 4 metre wooden tripod normally used with a laser leveller.

The increase in elevation provided a better perspective on the survey area, enabling the survey to be completed in high detail with fewer setup points.

The excavation process also revealed old water drainage areas such as creeks and gullies that had filled with sand – material that would normally be sent to the plant with the ore.



Histogram showing total surface change can be output to Excel™ for statistical analysis

The data was processed in I-Site Studio™ software. The trial areas were filtered to a consistent 200 mm point separation and topographic models were created.

20 scans were taken prior to excavation, and 47 scans were acqured of the highly irregular surfaces post-excavation. Each scan contained up to 600,000 points.

The final surfaces were compared against the originals using the I-Site Studio 'distance from surface' colouring tool, which shades the final surface according to the distance from the original, enabling the user to easily identify areas of change.

This tool also computes the total surface change and outputs a histogram for further analysis, such as calculating how removal of this material affects the grade of the ore deposit. Grade estimations have varied greatly in the past from adjoining regions, probably due to the old drainage lines.

The trial proved to be a great success, with significant cost savings identified. Further work may be scheduled after evaluation of the data is complete.

Thanks to Rio Tinto Alcan Gove Operations

© Copyright 2008, Maptek Pty Ltd - 200811RT