

Accurate volumes for cost-efficient overburden removal



Topographic Scanning Streamlines Stripping

Rio Tinto Alcan is a supplier of bauxite, alumina and primary aluminium to domestic and export markets. It also produces specialty aluminas for advanced ceramics and fire retardants, anodes and technology solutions for aluminium smelting, and a range of engineered solutions for the aerospace and transportation industries.



Rio Tinto Alcan recently trialed 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. 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 four areas prior to excavation, and two days to scan the irregular final surface. Surveying using conventional methods would have taken at least a week.

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%.

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.

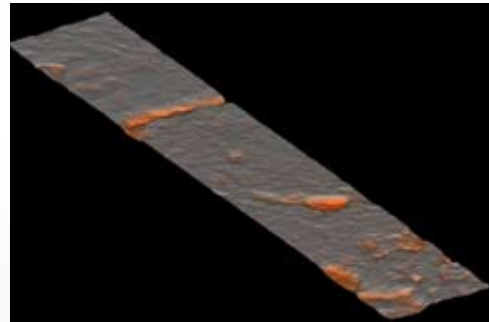


The increase in elevation provided a better perspective on the survey area, enabling the survey to be completed in high detail with fewer setup points.

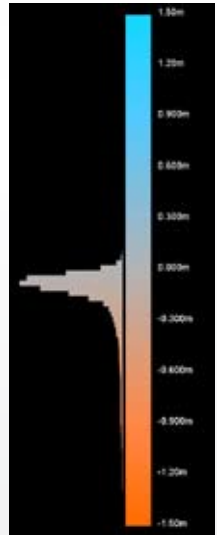
The excavation process also revealed old water drainage areas such as creeks and gullies that had filled with sand – material that would normally be sent to the plant with the ore.

The Maptek Advantage

- Consistent technical and software standards
- Proven technology adaptable to site requirements
- Skilled professional staff for consulting and field trials
- Solution meets site standards for industrial safety
- Demonstrated economic benefits
- Ease-of-use saves time in the field
- Accurate data improves mine productivity



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



Histogram at right 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. 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.

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

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.



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

Thanks to
Rio Tinto Alcan Gove Operations



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