Optech

Field Notes

Mine Planning: Volume Calculation

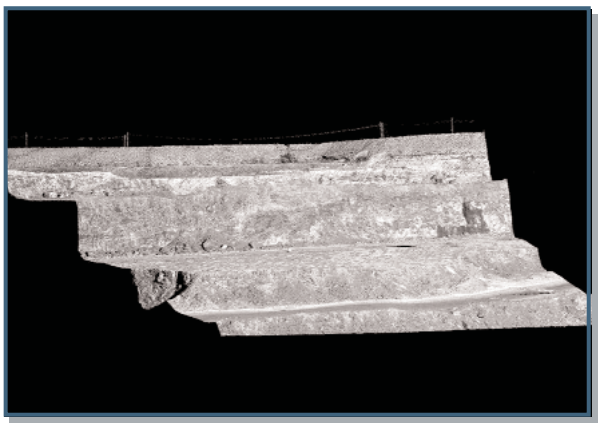
Data collection for current methods of open mine volume calculations are long and often dangerous undertakings. Single point collection with a total station and pole man along various slopes and faces is labor intensive, costly, and most importantly, hazardous.

Both pre- and post-blast measurements, as well as stock pile volumes, can be collected much more effectively using lidar technology.

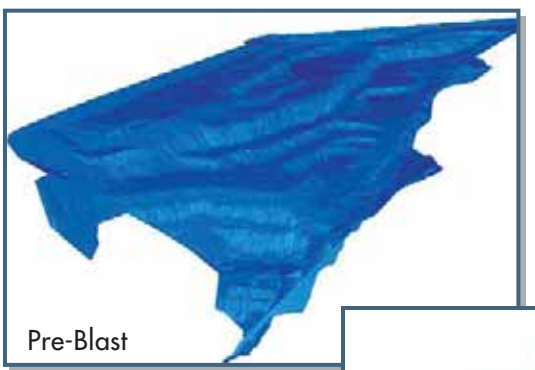
In early 2002 Potgietersrus Platinum Ltd., which is a member of Anglo Platinum, a division of Anglo American Plc., contacted Optech. Potgietersrus Platinum Ltd., located in South Africa, was experiencing volume reconciliation problems between surveyed volumes and volumes obtained from their fleet performance management system (dispatch). They were looking for a more efficient method to regularly survey the open pit more accurately. Typically it required 2-3 surveyors and 4-6 survey assistants a full day to measure the open pit (depending on size) and two days to process the month-end survey data. The collection of information on stockpiles and month-end reconciliation took a further two days.

Both Potgietersrus Platinum Ltd. and Optech felt this was a process that could be significantly improved using the ILRIS-3D laser scanner. As such, ILRIS-3D was used to collect survey points for volume calculation simultaneously with the mine survey crew. The purpose of the test was three-fold:

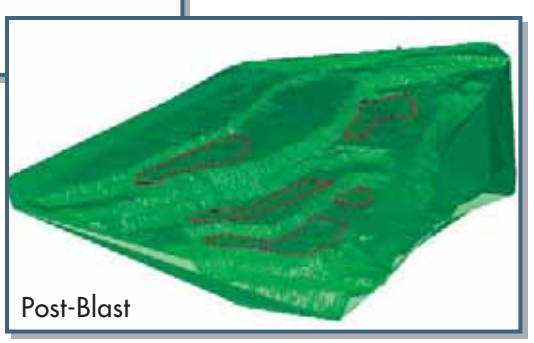
1. To demonstrate that the scanner is a fast, efficient tool for volume calculations
2. To confirm that any scanned data could be quickly transformed into any mine grid system for a variety of grade analysis
3. To prove that ILRIS-3D provides a more cost effective, convenient and safe way to do the volume calculation.



A table/face is scanned both pre- and post-blast. A comparison of the two data sets reveals highly accurate blast volume. Time required: Four hours Size of survey crew: One



Wireframe model generated and area of volume calculation isolated.



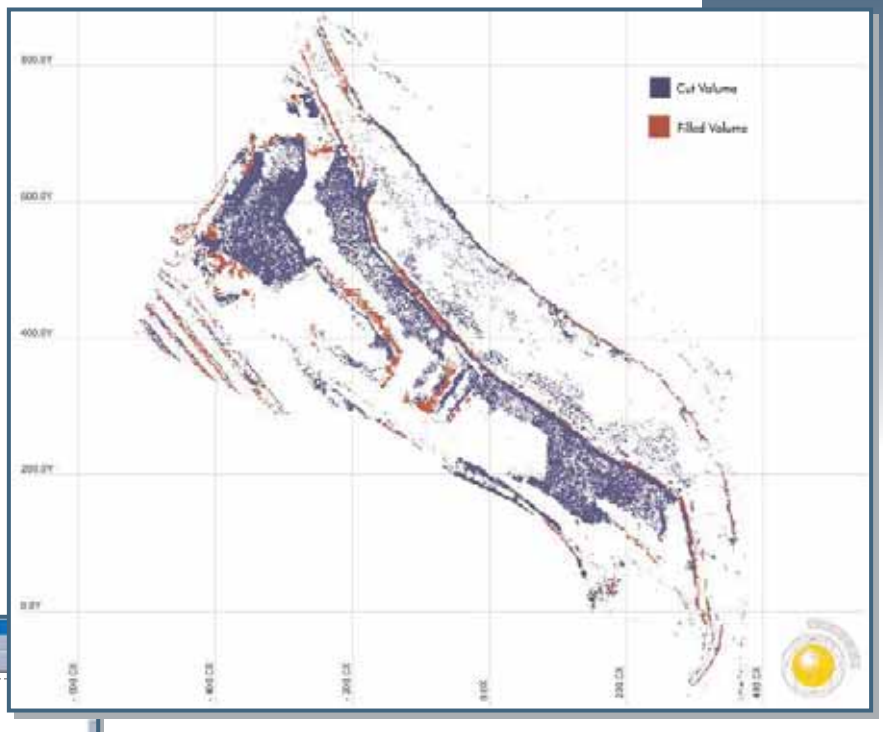
All data sets are easily geo-referenced based on a three-point transformation into any mine grid system in post processing. Mining software such as Gemcom for Windows can manipulate the ILRIS-3D data to produce topographical surfaces. These surfaces can be queried against 3D numerical models of grade, density, or metallurgical quality, to generate a variety of reports, including:

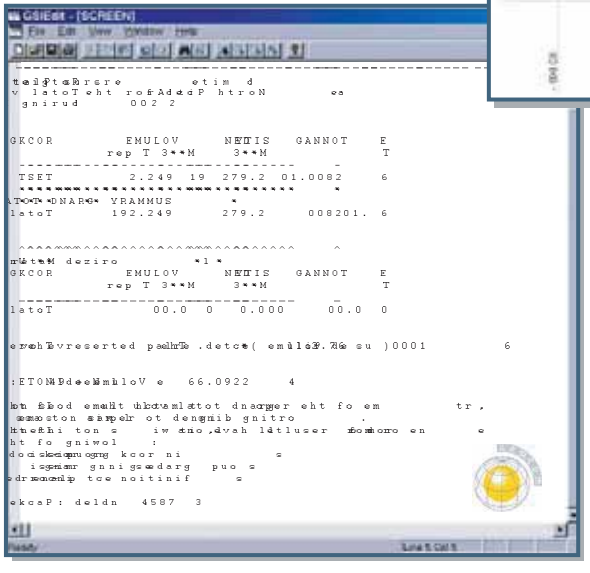
- Report per rock type (ore, waste)
- Volume, tonnage, grade, grade tonnage curves

ILRIS 3D

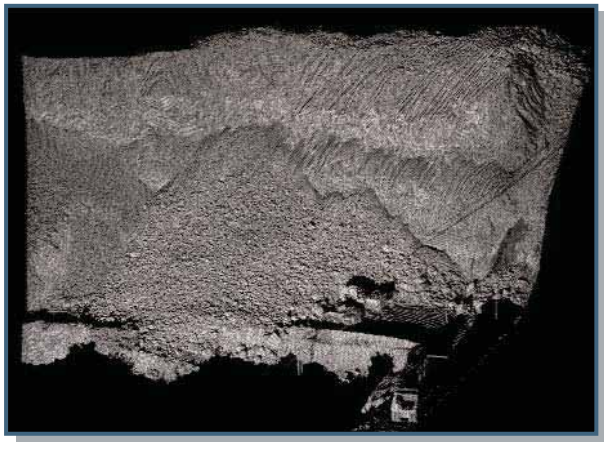
Volume accuracies are found to be well within allowable error budget, equaling or surpassing that of the survey and dispatch figures. These figures are able to account for insitu unbroken material, blasted/loose material still not loaded, and material moved during the period. The surveyor's time can now be better spent on generating management information rather than collecting data in the pit.

In addition to volume calculations, ILRIS-3D is utilized for slope/gradient analysis, face stability, blast hole location identification and grid assignment.ILRIS-3D can also be used to monitor the loading of ore for accurate reconciliation on a daily basis.





Various reports automatically generated including volume displacement and grade tonnage curves.



Overspill volume calculation is easily and accurately generated, a task which is virtually impossible without the use of lidar. Right: Unrendered point cloud of a typical overspill.

Other Applications

- Geo-technical surveys of high walls
- Slope stability
- Volume calculations
- Movement/mapping of geology and structural features

Time/Cost Comparison for Volumetric Calculations

	Time (man hours, includes processing)	No. of people required
ILRIS-3D	10	1
Traditional (Current) Methods	200	6-9

ILRIS-3D was able to reduce the disparity in volume between survey and dispatch, achieving substantial cost savings per month.

A safer, higher density, better data set was created with ~70% TIME SAVINGS

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