

## Laser scanning in extreme conditions

**Maptek I-Site™ operates under extreme weather conditions.** The Diavik Diamond Mine is located on a 20 square kilometre island in Lac de Gras, about 300 km by air northeast of Yellowknife, capital of Canada's Northwest Territories, and 220 km south of the Arctic Circle.



*I-Site 4400 scanner with protective jacket to keep out the cold*

### HIGHLIGHTS

I-Site equipment operates in extreme sub-zero conditions.

#### Features include

- High resolution imagery with underground light attachment
- Fast open pit survey and highwall mapping
- Data checked in field

Diavik has estimated reserves of 29.8 million tonnes at 3.2 carats/tonne (diluted). Diavik, 60% owned by Rio Tinto, operates three open pits with underground mining about to commence. A 350 km ice road supplies the mine site for four months of the year.

Ore production is approximately 2 million tonnes annually, with annual diamond production of about 10 million carats. Diamonds were first produced in 2003, and the mine life is estimated at 16–22 years.

Diavik Diamonds took delivery of an I-Site 4400CR in December 2006. The most important concern for Diavik was whether the I-Site instrument could operate at  $-50^{\circ}\text{C}$ . Since I-Site scanners are built in the warm temperate climate of South Australia, this needed investigation.

Maptek North American personnel first tested the scanner in the freezing conditions of a Denver winter with makeshift protective gear, before designing a prototype.

Once a cold weather 'jacket' was constructed to protect the scanner head,

they travelled to Diavik in January, the depths of the northern winter, and the scanner performed well, scanning the pit and stockpiles.

Geology applications, such as highwall mapping, cannot be carried out with ice and snow covering the benches, so this application was left until the subsequent site visit in the northern summer.

The I-Site 4400 battery is internal, making the scanner more portable than most.

During the 2006 visit, Maptek demonstrated the new I-Site 4400LR (long range scanner) and the recently developed underground light attachment. Although light is not required for laser scanning, the underground light is necessary to allow the capture of high resolution digital imagery underground.

The heated battery that had been developed and tested after useful feedback from site operators, was also used successfully. It is worth noting that the I-Site 4400 battery is internal, making the scanner more portable than most.



*I-Site scanner operating in summer (above) & winter (right)*



## TESTIMONIAL

The Diavik geology department saw the digital camera as a valuable tool for highwall mapping. For regulatory monitoring of compliance to the bench and catchment design, scans of the open pit have been matched against specifications. The comparison study elicited praise from the Mines Inspector for the level of detail provided.

The heated battery system, therefore, had to be carefully devised so that the internal operational parameters remained constant. On this visit, surveys were conducted on the underground and open pit operations, as well as the tailings pond, and data was presented to upper management.

Once Diavik broke into a Kimberlite pipe in late 2006, their requirement for the I-Site system became urgent. Maptek provided a rental unit to Diavik to ensure they could continue scanning until delivery of their own scanner.

The A154 pit, which is 600 metres across, can be surveyed in six scans. Monthly pickups which previously took days using GPS, are now completed in hours. About two hours of post-processing is all it takes to deliver a registered model which is exported into an .ireg file for import into Maptek Vulcan™ software. The geologists can then load the triangulations into Vulcan, digitising features such as fault joints and planes.

Laser scanning is a viable alternative to photogrammetry for open pit survey, with several key advantages.

The Diavik geology department's approval cemented the sale. They commented that the digital camera is a valuable tool for highwall mapping.

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The I-Site 4400 is a survey instrument, mimicking surveyors' existing workflows, so users take only a short time to become fully familiar with its use. Set-up and take down is rapid; on-site calibration is not required.

Faces, stockpiles and failures do not require marking with paint or reflectors for accurate automatic geo-location. This is a major safety advantage, especially in a harsh mining environment.

The scanner generates its own laser light for the measurement process, meaning it can obtain measurements under any lighting conditions, including times and places of high differential lighting.

The data can be checked instantly in the field, so there is no need to return to collect more data. There is also no need for off-site post-processing of data.

The Maptek team was easily able to demonstrate delivery of results on-site in the required timeframe. The fact that they were able to mobilise quickly to customise the system for the extreme conditions and to travel to the remote site testifies to their commitment to take on board the site's requirements and provide responsive support.

Diavik's feedback will most likely see the I-Site system become even more suited to their particular needs.



*Aerial photograph of East Island in summer*

*Thanks to  
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