

LASER SCANNING TECHNOLOGY IN MINING APPLICATIONS

LASER SCANNING TECHNOLOGY IS GAINING MORE AND MORE INFLUENCE IN MINING. ESPECIALLY IN OPEN PIT SURVEYING, FAST AND SAFE 3D DATA ACQUISITION OF EXTENDED AREAS OFFERS NEW POSSIBILITIES FOR EFFICIENT WORKFLOW.

Image above: Comparison tests at Mt. Tom Price mine: Craig Denham, Project Surveyor at Rio Tinto's Tom Price mine, was really enthusiastic about the measurement results acquired with the new VZ-1000.

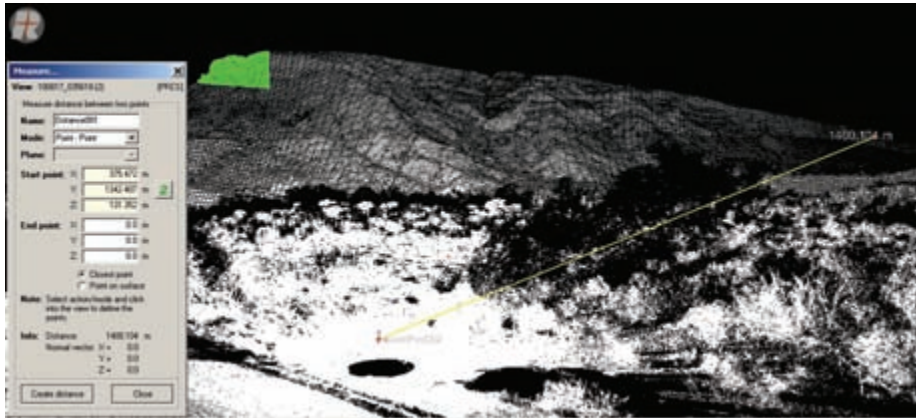
In 2009, *RIEGL* Laser Measurement Systems, a leading manufacturer of laser scanners for terrestrial, airborne, mobile and industrial laser scanners, launched its V-Line® laser scanner series providing echo digitization and online waveform analysis, at measurement rates up to 300 kHz.

The first terrestrial V-Line scanner, the *RIEGL* VZ-400, is a High Speed & High Accuracy Laser Scanner, with a maximum measurement range of 500 m and a precision of 3 mm, perfectly meeting the challenges in applications like mining, tunneling or underground mining.

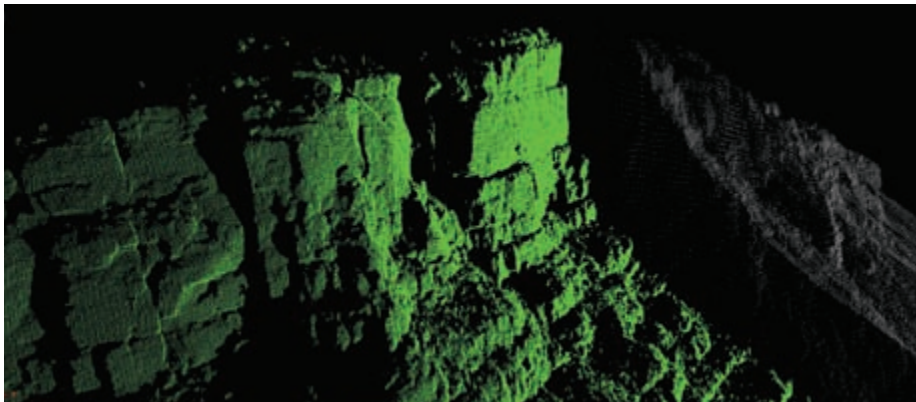
State-of-the-art laser technology for long range applications

This year, the latest results of *RIEGL*'s R&D efforts, a high-performance V-Line Terrestrial Laser Scanner for extremely long-range applications, was introduced at INTERGEO 2010, in Cologne. Especially designed for surveying in open pit mining, the new *RIEGL* VZ-1000 offers a very long range up to 1400 m, in combination with high-accuracy and high precision, while still operating in Laser Class 1. Obviously, considering its operational area, the instrument is dust and splash-proof.

Furthermore, state-of-the-art laser technology offers multiple target detection for each single laser shot, enabling you to measure better through the ever-present dust and to penetrate – up to a certain degree – obstructive vegetation, often covering large disused areas in open pit mining.



Testing the range measurement capability of the VZ-1000 at Mount Nameless (Jarndunmunha), near Tom Price Mine.



Mount Nameless scan detail.

High performance meets user friendliness

Data acquisition of large areas by laser scanning is the basis for further processing in mine surveying – and it is known as hard, time-consuming, and often hazardous work. To improve the quality of acquired data, but also to improve the conditions of acquisition, as well as to minimize time and thus, to minimize costs for outdoor measurements, that's what mine surveyors are looking for.

As a consequence of its light-weight and the integrated Human-Machine Interface (HMI) for stand-alone operation without computer, a single person in the field can easily operate the *RIEGL* VZ-1000. An internal storage capacity of up to 32 Gbyte and the optional add-on rechargeable battery, support straightforward, fast and efficient data acquisition. A water and dirt resistant keypad, with large buttons, allows operating the scanner even with wet or dirty hands, or while wearing gloves.

Integrated inclination sensors, laser plummet, and compass provide additional data, enlarging the possibilities of data processing. An integrated GPS receiver, with antenna, allows smooth integration in mobile scanning applications; and for combined photogrammetric applications, the scanner can be equipped with a high-resolution digital camera.

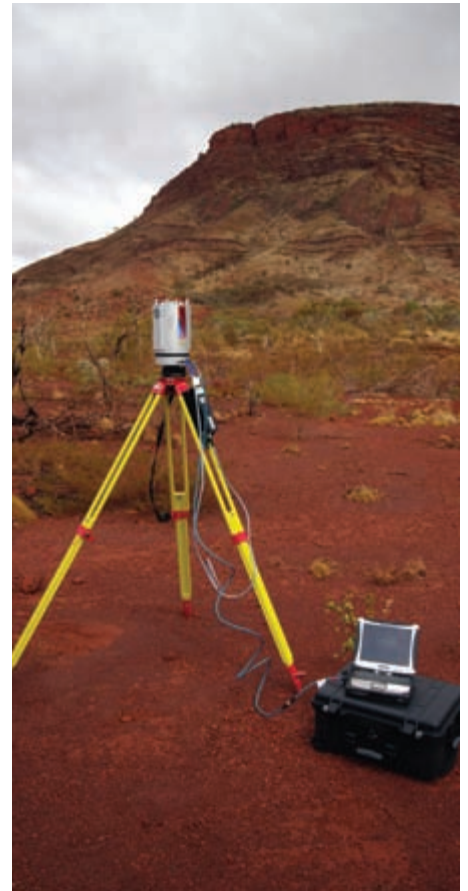
Tested in the Australian field

The first devices of the new VZ-1000, having already been delivered to *RIEGL*'s Australian distribution partner, C.R. Kennedy & Company Pty. Ltd., were successfully tested in the field. C.R. Kennedy, with headquarters in Melbourne and branch offices in Sydney, Perth, Adelaide and Brisbane is Australia's largest distributor of photographic, surveying, surveillance, medical, and digital audio equipment.

John Reddington, National Laser Scanning Manager at C.R. Kennedy, was really excited about the first results acquired with the new V-Line scanner: "In September, we completed trials at three iron ore mines in Western Australia. Feedback about the VZ-1000's initial test results was excellent. We believe this will become our most popular instrument!"

One of the first mines that tested the new scanner was Rio Tinto's Tom Price's Mine, in the Pilbara region of Western Australia. Rio Tinto, one of the world's leading mining and exploration companies, is operating on nearly every continent. In Australia, Rio Tinto had already been using *RIEGL* laser scanners for several years, for data acquisition in their mines.

The Tom Price Mine, in the picturesque Hammersley Ranges, has been operating since the 1960s, in the exploitation of iron ore. It is one of 11 mines owned by Rio Tinto, which also owns the largest privately owned



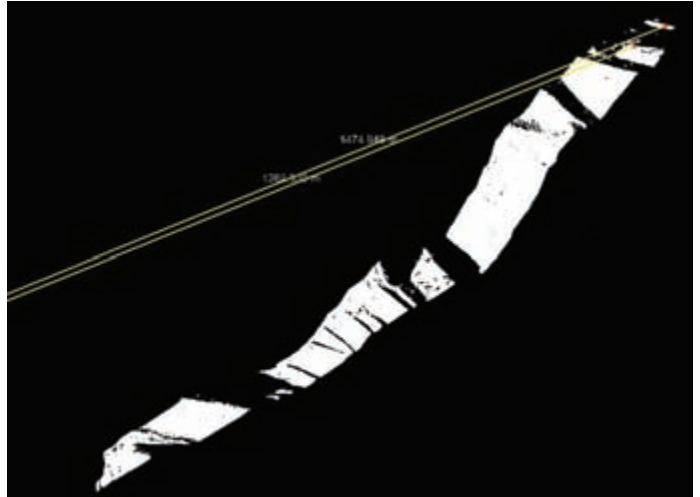
Australia, Mount Nameless: The results of test trials on red iron dirt exceeded the expectations.



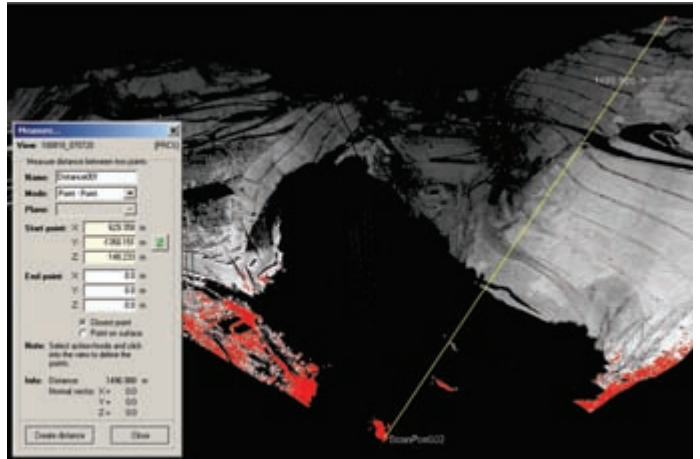
Australia Woodie-Woodie Manganese Mine: The *RIEGL* VZ-1000 proves or substantiates itself with an excellent performance.



Testing the range measurement capability of the VZ-1000 at Mount Nameless (Jarndunmunha), near Tom Price Mine.



Range indication from the surface of the iron ore at Tom Price mine (Rio Tinto).



Testing the range measurement capability of the VZ-1000 at Tom Price mine (Rio Tinto).

railway in Australia.

Measurement data acquired with their *RIEGL LMS-Z420* scanner was already available for comparison. "In typical red iron ore the LMS-Z420 will measure around 750m of usable data. The VZ-1000 measures up to 1400m in the same conditions. This exceeds our expectation! It is a fantastic instrument", commented Craig Denham, Project Surveyor at Rio Tinto. Their main tasks with the scanner are ongoing pit wall measurements, as well as volume calculations from the stockpiles. The surface models can also be used for "bench mark" references for ongoing quality assurance. They provide a historical "Snapshot" of the pit at any given time. Enhancing the range measurement capability and increasing the measurement quality, by using the new V-Line scanner, will minimize the work in the field and offer new possibilities for further processing.

The other site C.R. Kennedy tested the new scanner at was Woodie Woodie, a manganese mine run by Consolidated Minerals and HWE. Their surveyors have a total of 10 open pits to survey, as well as numerous stockpiles. This is quite a large job for a small group of surveyors. They were really convinced that a vehicle mounted VZ-1000 would significantly speed up their survey tasks.

Mike Annear, National Laser Scanning Specialist, Survey at C.R. Kennedy reported: "We were pleasantly surprised to find the scanner getting good returns from ranges up to 1400m from the dark grey manganese ore. The client was also very impressed with the speed of setup and the scanning speed itself."

One of the first VZ-1000 Laser Scanners delivered to Australia was purchased by Xstrata and is now operated at Newlands Coal Mine, in Queensland. Andrew Hardie, head surveyor at Newlands Coal Mine, "We have had experience with a few scanners before –

and we were really impressed with the small size, the extreme speed and the ease of use of the VZ-1000." Mike Annear, running the training course with the surveying team there, added: "It's really a fine job to show the new users how to run this fantastic instrument – and to see how enthusiastic they get realizing the enormous range of services offered."

Conclusion

With its high performance and user friendliness, the *RIEGL VZ-1000* is the ideal solution for surveying in open pit mining. The quality of acquired data is significantly improved; working conditions are defused and time exposure. Therefore, costs for out-door measurements are minimized – not only in Australia.

Furthermore the new scanner, providing online waveform processing and echo digitization, is the ideal choice for mid to long distance applications in topography, as-built surveying, architecture and facade measurement, archaeology and cultural heritage documentation, city modeling and civil engineering.

Links:

Consolidated Minerals and HWE – www.hwe.com.au

C.R. Kennedy & Company Pty. Ltd. – www.crkennedy.com.au

Rio Tinto – www.riotinto.com

Tom Price Mine – www.riotintoironore.com/ENG/operations/501_mount_tom_price.asp

Article by *RIEGL LMS*