

Laser scanning makes quick job of rail survey

The use of innovative 3D laser scanning technology from Leica Geosystems meant that Australian surveying company North Surveys were able to complete the survey of a section of rail network in record time and with an extremely high level of accuracy.



North Surveys' Ian McDonald analyses the scan data using cyclone software.

Brisbane-based, North Surveys Pty Ltd, were awarded 141 km (two sections) of the 390 km (seven sections) tender for mapping the existing Victorian rail network for a proposed upgrade of the line – “Regional Fast Rail Project – Bendigo Line”. The task, however, became a significant challenge when they were only given 7.5 weeks for its completion.

Latest technology to capture data

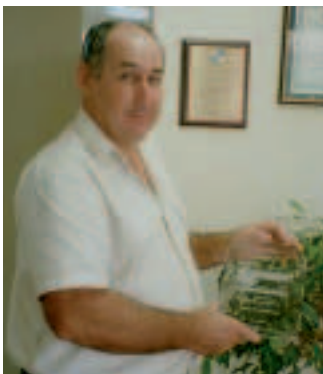
Careful not to jeopardise quality of data surveyed, North Surveys decided to utilise a range of methods and the latest technology to capture the data and achieve the best and most accurate results. The open country surveying was undertaken using Leica GPS/RTK and consisted of one base station and four rovers. Confined spaces were surveyed using conventional EDM and

the surveying of structures which included 13 railway stations, 25 bridges and two tunnels, were captured using the Cyrax 2500 3D laser scanner. 3D laser scanning is a new method for the spatial recording and visualization of objects. A laser beam automatically detects the three dimensional coordinates of an object. Thousands of points are measured in a single second to combine millions of object points in order to document the entire object with extreme accuracy.

It was after the job had commenced that North Surveys decided to test the 3D laser scanning technology. Following the purchase of a Cyrax 2500 3D laser scanner from Leica's Australian distributor, C.R. Kennedy and Company Pty Ltd, they received immediate and thorough training.

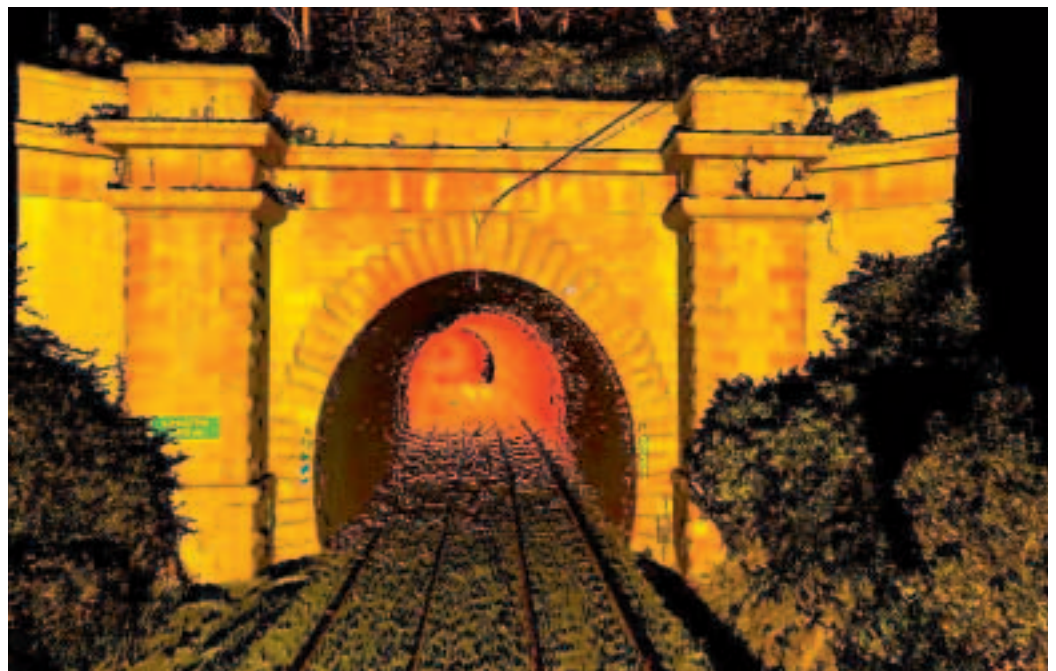
“Incorporating this new scanning technology required innovative procedures, methodologies and techniques for its use,” said Director of North Surveys, Mr Frank North. “To date, there is no manual or procedures for its use in a surveying environment, except for those that we have developed.”

The various methods of data capture used achieved different rates of production. The Cyrax scanner was able to cover 1km each day, whereas the rovers covered 12 km a day. With four or five crews operating similar technology, there was pressure to achieve a high rate of productivity without having to revisit a site for re-measurement due to invalid recordings. All surveys were then processed in proprietary software and/or Keays, merged, tidied and then passed into Microstation for



Director of North Surveys, Mr Frank North with the Excellence in Surveying Award.

Scanning of a railway tunnel for the Bendigo project: the surveying of structures which included 13 railway stations, 25 bridges and two tunnels, were captured using Cyrax 3D laser scanning.



final presentation and delivery.

"Our use of the 3D laser scanning technology for this project was accurate and extremely timely," said Mr North. "It far outweighed the usual conventional manual methods normally used today."

"Excellence in Surveying" award

It was due to this innovative use of technology that the project "Regional Fast Rail Project – Bendigo Line", undertaken on behalf of the Department of Infrastructure from the Victorian Government, won the Award for Open Project category of the 'Excellence in Surveying Award 2002' from the Institution of Surveyors Australia, Queensland Division. The Open Project category refers to no restriction of scope, size or nature of entries. Projects are judged on technical excellence, innovation, sensitivity to the environment, benefit to the profession and community and quality of presentation.

"This award has come about through great team effort and all the staff are to be congratulated for playing a vital part in each and every role," said Mr North.

"Whilst the project in its own right is not unique, difficult or out of the ordinary, what turns this project into a contender for discussion, review and scrutiny is the sheer logistical exercise required to bring together a range of resources and technology to match the required scope of works," Mr North said. "We achieved the required deliverable all in a very short timeframe, in an unfamiliar environment, 1,800 km from home, whilst

Cyra laser scanning technology*, from market leaders Leica Geosystems, has many fields of applications typically including factory plants with numerous pipes, drilling platforms, tunnels and other infrastructure building works.

The new measurement technology offers numerous advantages at the same time: the ability to quickly scan an object without physical contact from up to one hundred metres away and with a precision of better than 6 millimeters; complex forms are not a problem; dangerous and hot objects can be documented fast from a safe distance. Every detail is included automatically, producing an object that is easily recognizable. It is also possible to gain additional information from the Cyra data set which goes beyond pure spatial information, for example, determining references to changed material structures by delivering different laser reflection.

**now described as High Definition Surveying™, the new standard and refined description of what has often been previously referred to as "3D laser scanning". The Leica HDS2500, is a re-labeled Cyra® 2500 scanner, Leica Geosystems' (and the industry's) most popular scanner to date.*

More information: http://www.leica-geosystems.com/investor/news/high_definition_surveying.htm

at the same time developing and training in the use of new technology."

"At the completion of the project, the client commented they were surprised that we were able to finish in the timeframe allowed given the large portion of the project allocated to us," Mr North said.

Continued use of 3D laser scanning

Since the purchase of the Cyra laser scanner, North Surveys have identified a huge market for its use. Their scanner is one of only seven commercial units currently available in Australia. First used to scan the railway bridges in the Bendigo Line project, it has now been mounted onto an extendable mast on a truck, to allow efficient scanning of objects from many different angles and heights. The scanner has never been short of jobs. It has scanned the draglines at BHP mine sites, was used in the \$90m revamp of the Australian Paper Mill at Petrie, recorded the pipeline system at the Gladstone Power Station and scanned the collapsed gas tank at Luggage Point in order to assist in the salvage and determine the cause of the collapse.

"The promotion and marketing that has followed as a result of the introduc-

tion and development of the new 3D Laser Scanner technology will contribute towards cementing the surveying industry as being the 'owners' of this technology," said Mr North.

"By utilising this technology, we can push our clients' what will be main-stream in maybe five or ten years time," said Mr North. "The scanner will save our clients time and money, and will deliver an accurate spatial data sets in a timely manner."

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North Surveys have designed a special truck where the cyra laser scanner is mounted on an extendable mast.



Continued projects for North Surveys have included the scanning of pipelines at BP Refinery in Queensland.

