

Integrated Reality Capture in the Rail Environment

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ABSTRACT

Just imagine how transportation will operate and be managed in the future. With ideas like Hyperloop (that may soon be a reality) and the plausibility of high-speed trains, we more than ever need to challenge current methods of rail design and the format of design inputs that we so heavily rely upon to ensure 'good design'. Behind all rail designs are spatial datasets, often captured by methods that provide known outcomes and certainty. However certain, the data can lack sufficient detail to make informed decisions. Efficient design workflows, creative design and option engineering often suffer at the hands of limited design inputs. Whilst there is no doubt that the existing operations and fundamental workflow structure of rail alignment and spatial positioning in the rail environment is highly successful in today's application, our question is "How can we leverage off modern technology to create design inputs which enable greater efficiency, enhance creativity and maintain spatial integrity and certainty for the future of rail design?" Terrestrial and mobile laser scanning are not new applications of spatial capture and the resultant point cloud deliverables are used widely in today's industry. That said, laser scanning accuracy and repeatability have long lived under a perception of uncertainty, which has created a reluctance of use in the rail environment. Over the last year, testing of alternative capture methods through project application has been undertaken with success. We are now looking to efficient ways of integrating and applying workflows to mobile and terrestrial laser scanning, terrestrial positioning, GNSS real-time observations and digital level runs to provide spatial certainty and enhance design capability. At present, our analysis of integrating unconventional and conventional methods of modern reality capture has provided a level of accuracy suitable for all rail design applications. We are encouraged by these findings and believe we will soon be demonstrating a path to the future of rail environment reality capture.

KEYWORDS: *Integrated survey methods, rapid data reality capture, rail corridor, mobile laser scanning.*

Bringing ideas to life

Integrated Reality Capture in the Rail Environment



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Bringing ideas to life

“Given the pace of disruption, companies need to ready themselves for a future that is not yet written”
Giam Swiegers, Aurecon CEO

An industry of change



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Aurecon Safety

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*Because people
depend on you*

Awareness

Attitude

Understanding

Communication

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Current State

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Capture through conventional methods. Why?

It works!

However, this begs the question....

What is the consequence of not pursuing new
technology?

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Imagine what is possible?

Advances in capture technology are significant

Integrated capture



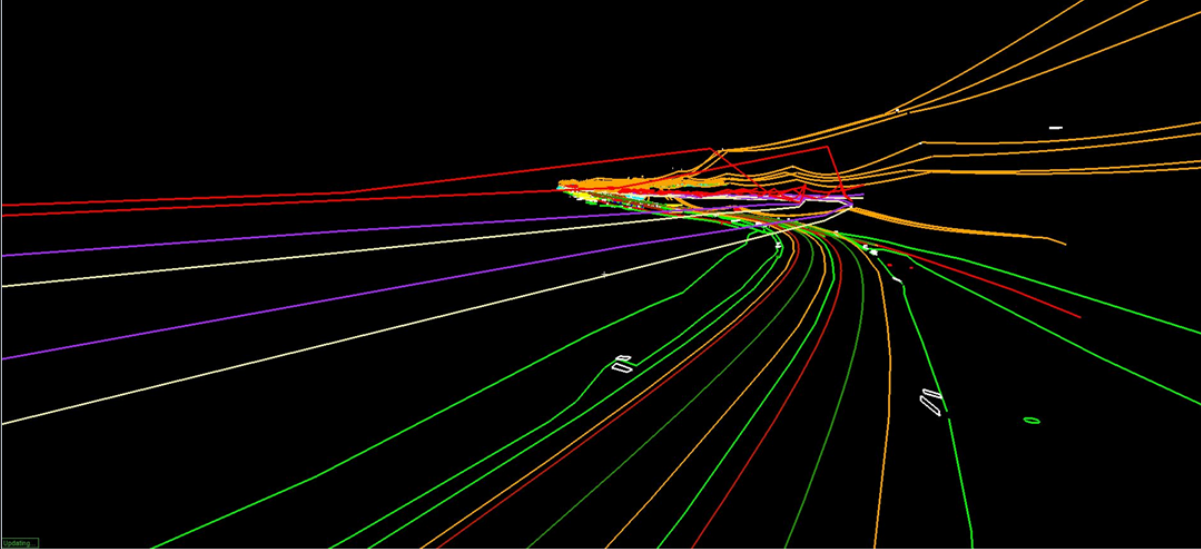
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Why change?

Traditional capture



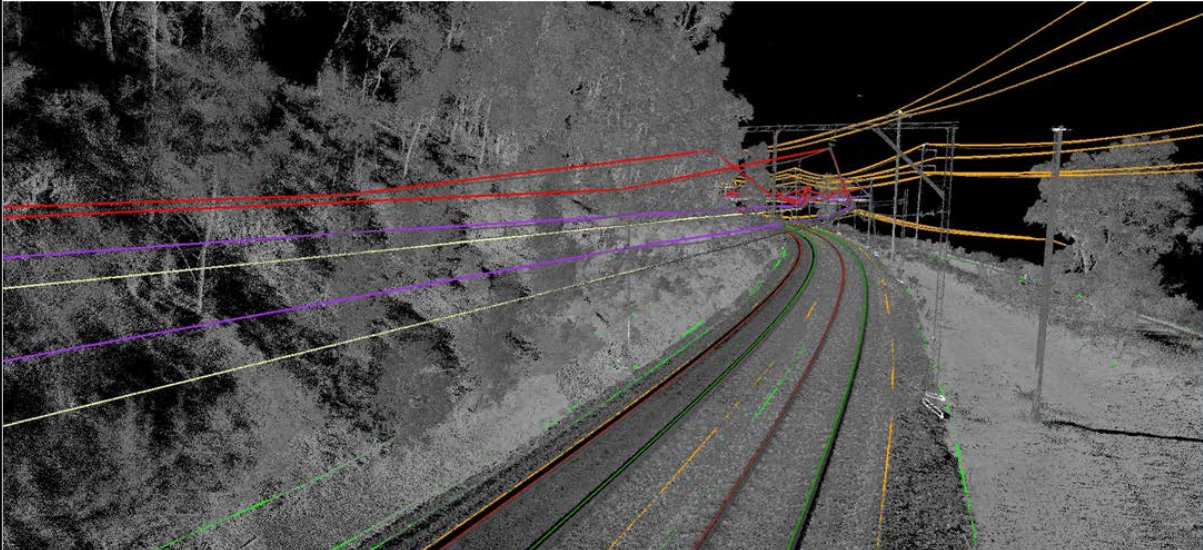
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Why change?

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Rapid data capture and extraction



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What is the outcome?

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Complete registered point cloud – for visual purposes mostly

Usability of large point cloud data presents challenge to existing systems and software, so...

Tiled point cloud delivery 500m sections

Point cloud extraction by understanding project parameters:

Virtual surveyor – point only extraction ✓

String based solution – CAD linework ✓

Basic objects modelling– No metadata associated

Complex objects – Metadata associated (post extraction)

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Validating the results

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Rigour around GCP locations and check point comparisons!

Considerations:

- Spacing of GCP's
- Designated check points in space – Conventional capture vs extraction
- Residual analysis and confidence
- Demonstration to all users of the data

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Conclusion

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Application of MLS and integrated survey techniques is fit for purpose in all rail assignments

MLS is not yet suitable as a stand alone method of capture and delivery

We will continue testing on future projects to build efficiency into processes and add value to future users of rail capture

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