

RIEGL VMR Field Test



project supported by Dr. Döller Vermessung ZT GmbH
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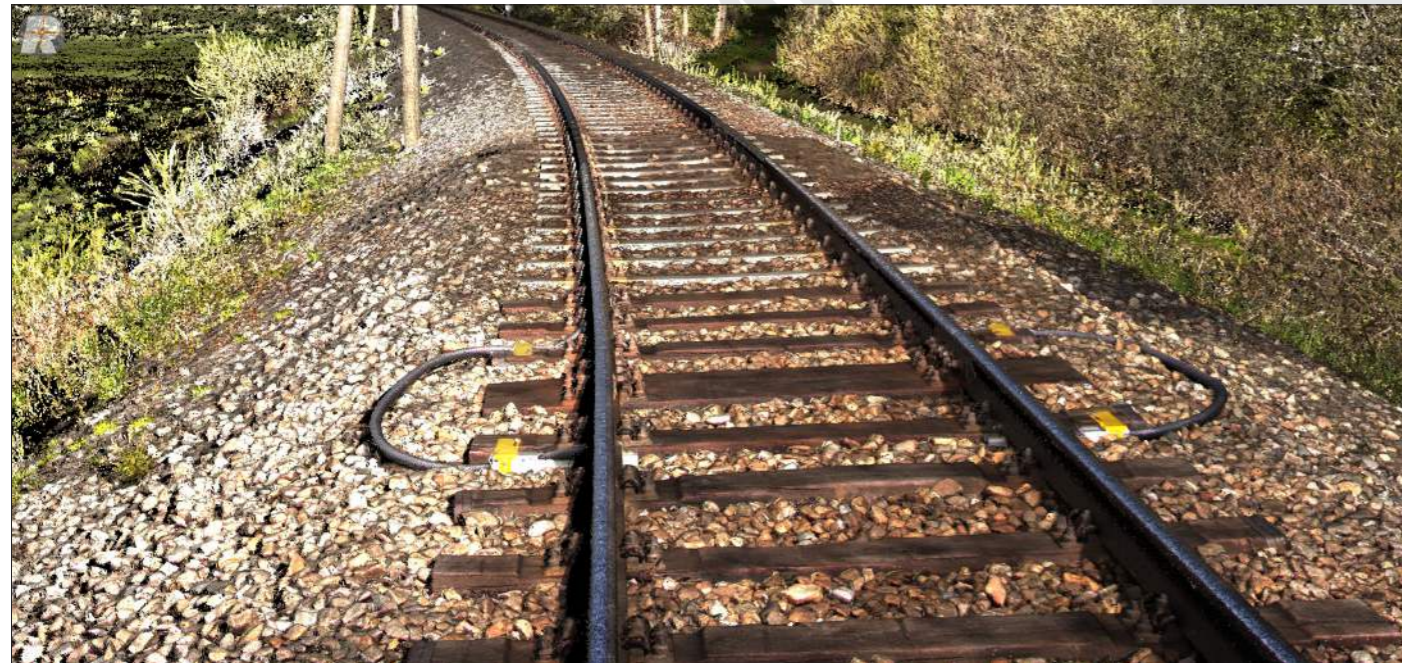
RIEGL VMR: data acquisition in Stop & Go mode at the test track in Lower Austria



While the scanning platform is still working in the field, the operator can check the registered scan positions and scan data from a remote position via mobile device.

Project Data

Date	September 3, 2022
Total duration of data acquisition	1 hour : 14 minutes : 22 seconds
1 st scan position (0 m)	acquired at 09:51:30
58 th scan position (386 m)	acquired at 11:05:52
Distance between single scan positions	7 meters
Scan pattern	Panorama40 (22.5 mio measurements)



true-colored point cloud acquired in RISCAN PRO

NEW

RIEGL VMR



The *RIEGL VMR* is an extremely compact and robust robotic solution for railroad surveying applications.

The sensor part of the system, a *RIEGL VZ-400i* laser scanner, provides high-resolution scan data. In Stop & Go mode, it performs up to 50 scans per hour. These single scanning positions are registered onboard, with high precision and fully automatically.

Optionally, high-resolution calibrated photos are taken in parallel. The georeferenced point clouds are then prepared for exportation to dedicated third-party rail processing software packages.



Robotic Rail Laser Scanning System

Typical Applications

- High Detail Survey in Construction Site Operations
- Verification of Rail Clearance
- Establishing of Rail Infrastructure Information Management Maps
- Surveying of Railroad Tunnels and Subways

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Technical Data

RIEGL VZ-400i Laser Scanner Performance

max. measurement range 800m
 pulse repetition rate PRR 1.2MHz
 optional camera
 multiple target capability
 online waveform processing
 Wi-Fi and 3G/4G LTE
 Laser Class 1

Laser Pulse Repetition Rate PRR (peak)	100 kHz	300 kHz	600 kHz	1,200 kHz
Max. Effective Measurement Rate (meas./sec)	42,000	125,000	250,000	500,000
Max. Measurement Range ($\rho \geq 90\%$)	800 m	480 m	350 m	250 m
Max. Measurement Range ($\rho \geq 20\%$)	400 m	230 m	160 m	120 m
Minimum Range	1.5 m	1.2 m	0.5 m	0.5 m
Ranging Accuracy / Ranging Precision	5 mm / 3 mm			
3D Position Accuracy	3 mm @ 50 m, 5 mm @ 100 m			
Field of View (FOV)	100° vertical / 360° horizontal			
Eye Safety Class	Laser Class 1 (eyesafe)			

Further details to be found on the current RIEGL VZ-400i Data Sheet.



Weight ^{1) 2)}	approx. 60 kg
Rechargeable Battery (exchangeable) Capacity / Voltage	Lithium Battery 12S approx. 16 Ah / 44.4 V
Power Consumption	70-100 W (for operation time 8 hours)
Setup Time	less than 30 minutes
Emergency Stop	available
Operation Mode	automatic Stop & Go operation e.g., Panorama40 laser scan every 7 meters
Track Gauge	adjustable from 1,000 mm to 1,435 mm
Total Height of VMR	approx. 2 m (customizable according to customer requirements)
Protection Class	IP 54

1) weight of rechargeable battery, scanner and optional camera not included 2) demountable, weight of single parts less than 20 kg

General Information

The RIEGL VMR Robotic Rail Laser Scanning System is designed to fit to all common gauge tracks that are used worldwide by providing an adjustable gauge track width from 1,000 mm to 1,435 mm.

In Stop & Go mode, the VMR system stops every 7 meters to take more than 20 million measurements with millimeter precision in one minute. The system can be operated with a maximum speed of 1.5m/sec. Thanks to the stable integration of the scanner in the robotic platform, the consistent central position on the track, and the regular distance of the scan positions, the resulting point cloud provides excellent homogeneous point density distribution.

The acquired scan positions are automatically registered with each other in the laser scanner with high precision and robustness. Parallel to the scanning process, the VMR provides an optional camera system for up to four cameras to take high-resolution photos at every stop position. Additionally, a fifth camera is available on top of the RIEGL VZ-400i. These pictures allow the photo-realistic colorization of measurement data.

To enable the acquisition of photos in dark environment (e.g., tunnels), the VMR can optionally carry a lighting system with four LED lights.

During the work in the field, the operator's task is limited to observing the continuous progress. Registered scan data can be checked on a mobile device. In case of an unforeseen event, the operator stops the robotic platform by means of a remote emergency command. External control points can be added to verify measurement data. The data quality can further be increased by the use of a RTK GNSS.



grey-scaled point cloud of subway tunnel



user-friendly assembling



quick release adapter for convenient mounting of the scanner



optional lighting system with 4 LED lights



point cloud, colored by the use of the photographs