

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 Scanning System

Typical Applications

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



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► **Technical Data**

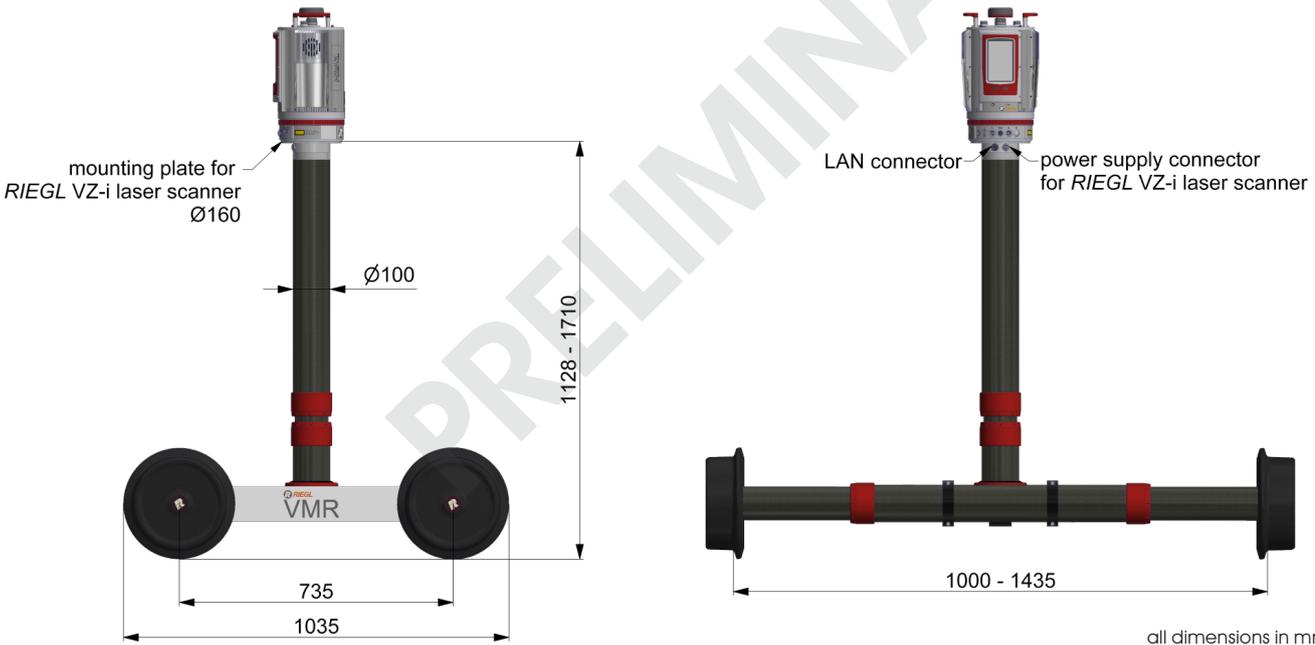
RIEGL VZ-400i Laser Scanner Performance

max. measurement range	pulse repetition rate PRR	online waveform processing	Wi-Fi and 3G/4G LTE
optional camera	multiple target capability	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
Accuracy / Precision	5 mm / 3 mm			
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.

RIEGL VMR Robotic Rail Scanning System



all dimensions in mm

Weight ^{1) 2)}	approx. 50 kg
Rechargeable Battery (exchangeable)	Lithium Battery 12S
Capacity	approx. 12.5 Ah (for 8 h working day)
Voltage	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., every 7 meters a Panorama40 laser scan
Track Gauge	adjustable from 1,000 mm to 1,435 mm
Height for Scanner Mount	adjustable from 1,120 mm to 1,720 mm

1) including rechargeable battery, weight of scanner and optional camera not included

2) demountable, weight of single parts less than 20 kg

General Information

The *RIEGL VMR* Robotic Rail 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, 6 high-resolution, fully calibrated photos can be taken by the optional camera mounted to the *RIEGL VZ-400i* at every stop position. These pictures are saved into the project structure and allow the photo-realistic colorization of measurement data.

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



point cloud, top view, color: X-ray view



point cloud, colored by the use of the photographs

RIEGL VMR Preliminary Field Test



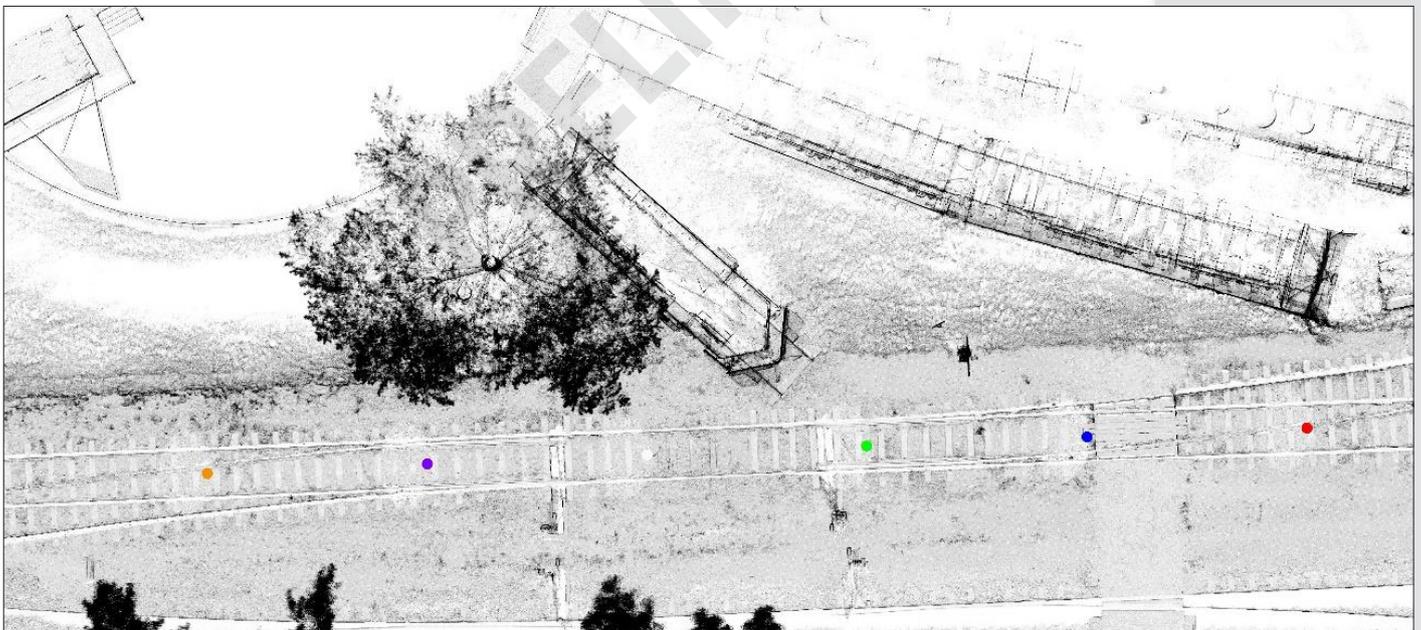
RIEGL VMR: data acquisition in Stop & Go mode at the test track in Lower Austria



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, 2021
Total track distance	approx. 2x 550 meters (survey in both directions)
Total duration of data acquisition	3 hours : 21 minutes
1st scan position (0 m)	acquired at 10:57:50
79th scan position (557 m) end of forward rail survey	acquired at 12:43:32
153rd scan position (1084 m) end of backward rail survey	acquired at 14:19:21
Stop time at each scan position	70 seconds
Distance between scan positions	7 meters
Scan pattern	Panorama40 (22.5 mio measurements)



Point cloud, orthogonal X-ray view from above: high level of detail on the track, the clearance and the surrounding area are included in the entire scan dataset.

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