

From Measurement to Maintenance Intelligence

Integrated measurement technology as the foundation for the next generation of rail maintenance.



Linalyzer: Linsinger's new modular measuring system.

Rail infrastructure maintenance is undergoing a fundamental transformation. Increased traffic, aging infrastructure, and growing demands for network availability and safety are driving the adoption of data-driven maintenance strategies. Rather than evaluating individual rail parameters in isolation, infrastructure managers increasingly require integrated platforms that combine multiple inspection technologies, standardised data structures, and automated analysis. Correlating different condition indicators provides a comprehensive picture of infrastructure health and creates the foundation for predictive maintenance and modern asset management.

Linsinger addresses this challenge with the Linalyzer platform, a modular measurement system that integrates multiple high-precision inspection technologies within a common hardware and software architecture. Its objective is not only to deliver highly accurate measurement data, but to transform that data into actionable information for strategic maintenance planning.

Building on more than two decades of

experience in rail maintenance technology, the Linalyzer combines proven measurement methods from Linsinger's rail milling trains with a new generation of optical and electromagnetic sensors and advanced data processing algorithms. The result is the simultaneous acquisition and real-time correlation of multiple rail condition parameters.

A key component is the vibration-isolated measuring bogie, which provides exceptional measurement stability at inspection speeds of up to 40km/h while enabling continuous measurement of complex infrastructure assets such as turnouts and crossings without interrupting normal railway operations.

The platform's modular design allows sensor configurations to be adapted to specific operational requirements. Depending on the application, the Linalyzer can combine longitudinal and transverse rail profile measurements, eddy current testing for near-surface defect detection, rail head height and track gauge measurements, rail quality index determination, and acoustic roughness analysis. Because all sensors operate simultaneously within a single integrated platform, the resulting dataset offers considerably greater value than the isolated evaluation of individual measurements.

Equally important is the software architecture. All measurement systems are controlled through a unified software platform that integrates data acquisition, visualisation, and analysis into a single workflow. By eliminating separate software environments and redundant datasets, infrastructure managers can move more efficiently from measurement to maintenance decisions.

Mobile applications

Linsinger has extended this platform concept with the Linalyzer to Go, a compact inspection trolley based on the same technology platform as the machine-integrated system. It delivers the complete Linalyzer workflow outside large measurement vehicles while ensuring full compatibility between mobile and machine-based inspections.

The Linalyzer to Go currently supports longitudinal and transverse rail profile measurements, eddy current testing, optical surface inspection, and rail quality index determination. Future developments will expand its capabilities with features such as rail head height measurement, track gauge

and cant measurement, GPS referencing, 360-degree environmental imaging, equivalent conicity analysis, acoustic roughness evaluation, and AI-assisted rail defect classification.

Despite its compact size, the Linalyzer to Go integrates numerous measurement technologies into a single device. It can be disassembled within seconds into two modules weighing less than 25kg each, allowing straightforward transport in a passenger vehicle. For particularly difficult access points, it can be dismantled even further. Battery operation for up to eight hours enables full-day inspections without requiring an external power supply.

One of the greatest advantages is its complete compatibility with the machine-integrated Linalyzer. Both systems use the same software environment, identical evaluation algorithms, and a common data structure. Preliminary inspections, construction monitoring, and final quality verification therefore become part of a single seamless digital workflow, providing consistent and directly comparable results regardless of the measurement platform used.

As rail maintenance continues to evolve, measurement technology is becoming a key element of digital asset management. Future developments, including rail crack growth prediction and the integration of historical measurement data, will further strengthen predictive maintenance by transforming individual inspections into a continuously updated digital representation of infrastructure condition.

With the Linalyzer platform, Linsinger goes beyond developing advanced sensor technology. By combining measurement systems, data management, and intelligent analytics within an integrated platform, the company provides infrastructure managers with the information needed to increase network availability, extend rail service life, and optimise maintenance planning through data-driven decision-making.



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