

# HEXAGON

## Automated Wheelset Measurement System Enables Predictive Maintenance

Case Study: Wiener Linien, Vienna, Austria



To enhance their rail vehicle maintenance operations, Wiener Linien selected Hexagon's CALIPRI X automated wheelset measurement system because of its quick, exact and reliable wheel profile measurement capabilities.

Clarity on wheel wear conditions allows more efficient condition-based and predictive maintenance, less downtime, better resource planning and significantly reduced maintenance costs.

But safety is the paramount priority in rail. To ensure the safe operation of rail vehicles, all wheels must be measured at frequent, regular intervals to ensure all operating tolerances are adhered to. Looking to

improve the efficiency and reliability of this process, Wiener Linien assessed various options available on the market that would allow them to increase the productivity of their maintenance operations. After a rigorous selection process, they chose Hexagon's CALIPRI X automated on-track solution for precise train wheel profile measurement.

### Unrivalled Technical Concept

Wiener Linien currently has three CALIPRI X wheel measurement systems in use for their rail vehicles. The first system was installed at the Erdberg site in June 2022 and by 2025 they will have a total of nine systems in use. Even before the first CALIPRI X overrun system was installed, Erwin Quintus, Technical Referent in the Rail Vehicle Technology department at Wiener Linien,



was impressed by the capability of the technology to provide quick, exact and highly reliable wheel profile measurement. *“Hexagon’s product prevailed over other well-known suppliers in an international tender. In addition to economic points, the CALIPRI X product was able to set itself apart from the competition primarily through its technical concepts,”* says Quintus, who has been working with wheel measuring systems for over seven years.

## Making Condition-Based and Predictive Maintenance Possible

Fundamental to improving maintenance efficiency is the ability to reliably capture accurate and very precise measurement data that can be used to determine the ideal maintenance activities and times and plan workshop resources accordingly. The other key consideration is how to carry out the measurement process with the highest degree of efficiency. With CALIPRI X, a single pass over the permanently installed system is sufficient to obtain all wheel parameters and wheel profiles. Measurements are taken using a laser light section method, with all wheel profiles of the vehicles recorded. The most important parameters and variables are known in seconds, and out-of-tolerance areas immediately identified. The data generated by CALIPRI X is then processed in Wiener Linien’s specially developed in-house software. This determines the ideal maintenance time and the necessary maintenance measures to achieve the longest-possible wheel service life with the most even workshop utilisation possible. *“It’s absolutely essential to have very good raw data for this, which the CALIPRI X system gives us,”* emphasises Quintus. Unplanned or unnecessary downtimes are avoided, workshop planning is improved and wheel service life can be significantly increased.

## Measurement Repeatability, Time and Cost Savings

In addition to improved maintenance efficiency and higher vehicle availability, the system also benefits Wiener Linien by reducing the workload in their workshops. Workshops worldwide are facing the major challenge of a shortage of skilled workers. Installing an automated wheel measuring system enables Wiener Linien’s vehicle technology department to deal with this and save time and money. *“In times of staff*

*shortages, the automation that CALIPRI X brings is essential to us,”* says Quintus.

Before using the system, like most of the industry, the Wiener Linien maintenance team still manually measured subway wheels. However, the manual, conscientious measurement of rail vehicle wheels was highly labour-intensive, time-consuming, less accurate and meant long vehicle downtimes.

The wheel profile, or, to be more exact, prominent points of the wheel profile, were measured using hand gauges attached to the wheel. However, the accuracy of such measurements is far from those of an automated system because only prominent points can be measured, not the entire wheel profile and results can also depend on the experience of the person making the measurements. Using mechanical gauges, it takes about 2.5 hours to measure all 48 wheels on a subway train. In comparison, with CALIPRI X, all 48 wheel profiles are determined in a single pass, with measurement data available in seconds after the pass. The system operates entirely autonomously, delivering exact results with unmatched repeatability. The employees’ only task is to periodically clean the system’s measuring glasses of dirt based on the weather conditions.

And because CALIPRI X has been installed directly in front of the car wash, one pass, including measurement, has been integrated into the daily process sequence, and several vehicles drive over this system daily. Making more measurements means more data on wheel wear is available for analysis, allowing Wiener Linien to accurately forecast wear levels.

*“Measurement repeatability is in the tenth of a millimetre range.”* Erwin Quintus, Technical Referent, Wiener Linien.

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