Vehicle Equipment
Measurement Systems (VEMS)

Facilitates condition-based maintenance to maximize availability and optimize costs.

In the rail sector, continuous maintenance is essential to maximize the availability of vehicles. However, rigid maintenance intervals and fixed inspection dates can create disruption and increase costs, due to down-time for rolling stock. It is a crucial yet fine balance, assuring optimum readiness and high levels of safety while limiting the number of unnecessary and costly inspections.

VEMS provide a range of automated inspections of rail vehicles to determine their serviceability and safety. The VEMS range is designed as a suite of modular measurement solutions installed on, or adjacent to, the track – providing roll-by checks of:

- Vehicle integrity
- Wheels
- Brakes
- Pantographs and collector shoes

VEMS solutions excel in condition monitoring, providing detailed and objective inspections to support the management of maintenance activities. By detecting critical equipment conditions, they help increase operational safety and protect your valuable assets.

The systems are supported by a comprehensive Data Management System (DMS); including a measurement database and facilities for analyzing, viewing and reporting measured data – along with tools to convert this data into usable, objective maintenance information.

SIEMENS

Your partner for reliable data

To make life easier, we have organized VEMS into modules based on specific features. These modules can be implemented separately or as a tailored group. VEMS solutions inform maintenance engineers which components or areas require attention, thus speeding up the entire workflow in the depot.

VEMS for Wheel Profile

VEMS for wheel profile provide highly accurate measurements of wheel parameters and generate a complete profile from the back of the flange to the rim face. All measurements can be applied during normal operation and lead to more precise data compared to previous time-consuming manual measurements.
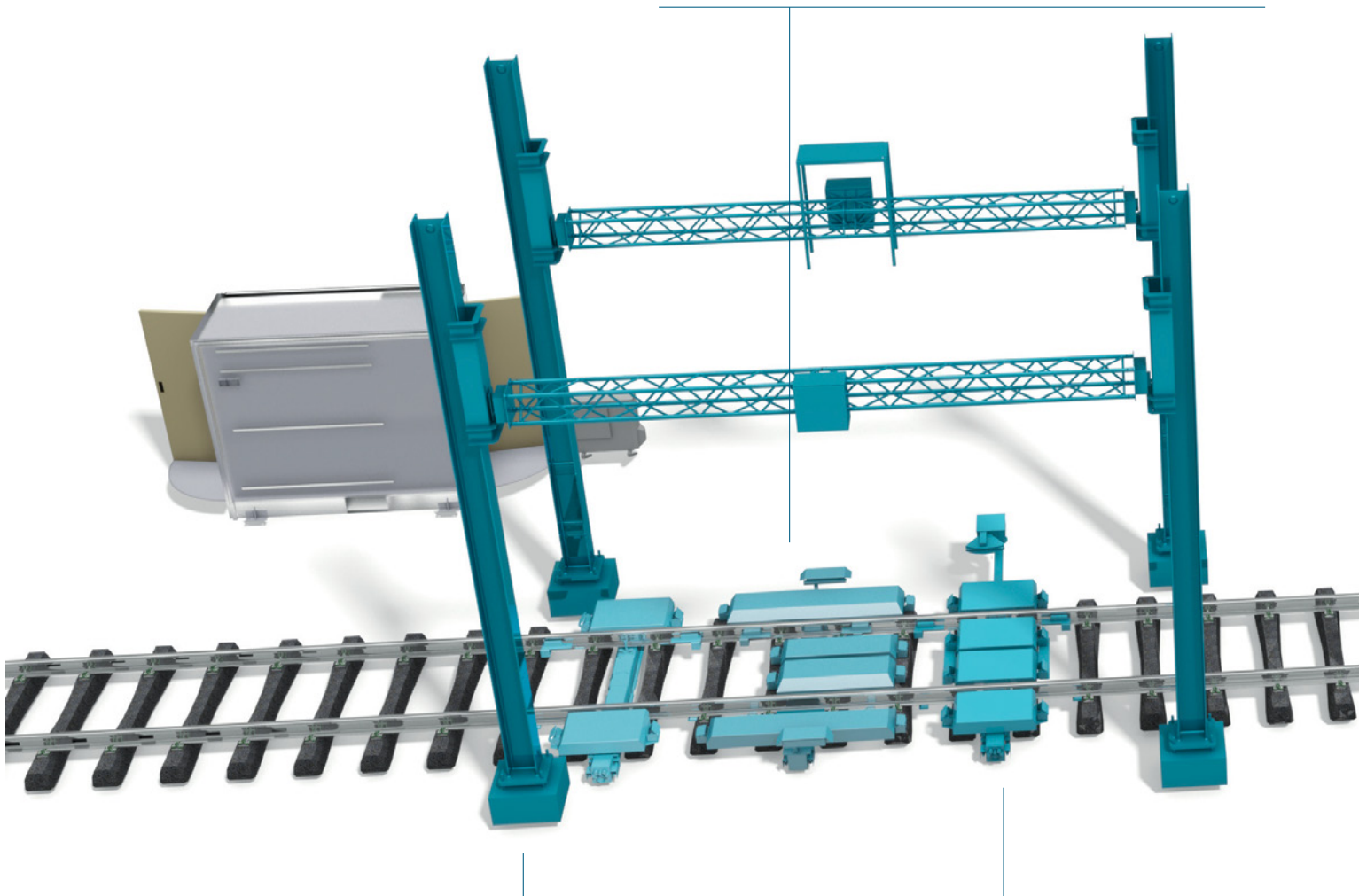
VEMS for Current Collector

The fully-automated VEMS for current collector measure the integrity of current-collecting components: the pantograph and collector shoes. The recorded data can be trended to derive wear rates and predict service life. And the measurement records can be stored, analyzed, viewed and reported in the Data Management System (DMS).

VEMS for Brake

VEMS for brake are based on high-precision, non-contact measurements of the friction materials and brake components. These systems measure the wear of brake pads, brake discs and brake blocks and can compare wear trends across axles, bogies, trains and fleets. Any missing components, such as brake pads, are reliably identified. All inspections take place during normal operation.

I **Our service** – your benefits

- Increased availability of rolling stock

- Cost savings as automatic vehicle inspection nearly fully substitutes the manual inspection of relevant components

- Improved safety thanks to more consistent measurements and component integrity assessment

- Superior planning through comprehensive data analysis

- Optimized life span of components until reaching technical wear limit

Can we remove these numbers and only leave the lines?
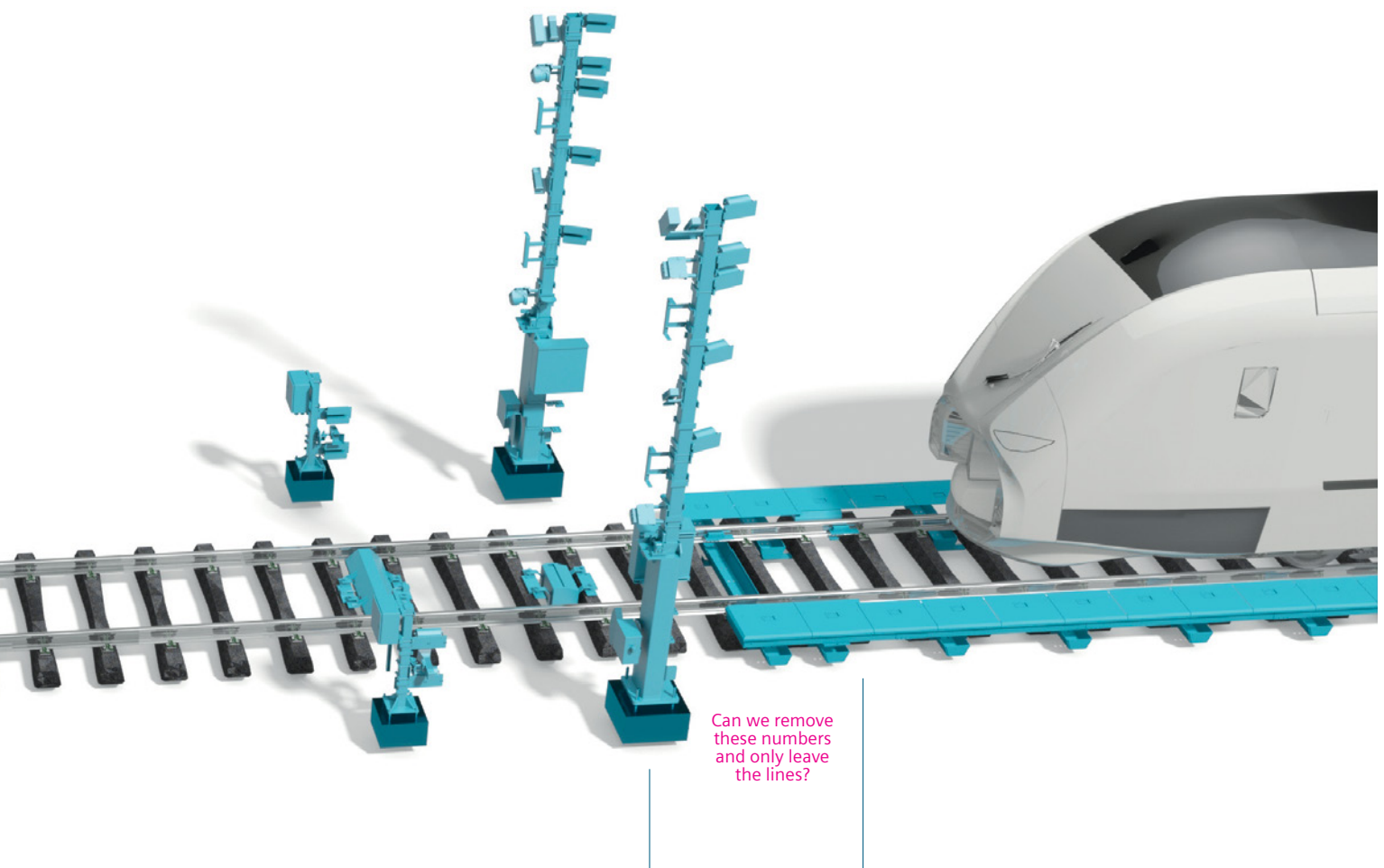
VEMS for Visual Inspection

The Visual Inspection System (VIS) replaces traditional visual inspection, allowing a virtual check while the train is still in service. It enables vehicle integrity checks before entering service or after leaving service, automatically inspects pre-selected parts and creates a complete digital image.

VEMS for Wheel Tread

By generating an exact digital image of the entire tread surface around the circumference, VEMS for wheel tread detect and report cavities, flats and out-of-roundness. This enables rapid, easy inspection of the full tread, which would be difficult to accomplish manually on a stationary train.

Much more than
automated inspections

Continuous monitoring of critical components already offers enormous financial advantages. But above and beyond time savings, VEMS also provide far-reaching strategic benefits: long-term storage and analysis of the recorded data allow for improved depot workflows and trend analysis.

In the standard version, VEMS offer basic reports in table form, listing the respective actual status and highlighting deviations from defined threshold values. There are also options available for increased analysis of gathered data.

Integration with Siemens Railigent®

VEMS data is stored and analyzed in the Data Management System (DMS). Additionally, all measurement data can be securely encrypted and transmitted to Railigent®, the platform for managing your rail assets smarter. By integrating data in Railigent® and by adding algorithms, optimized timing of maintenance tasks can be achieved (predictive maintenance).
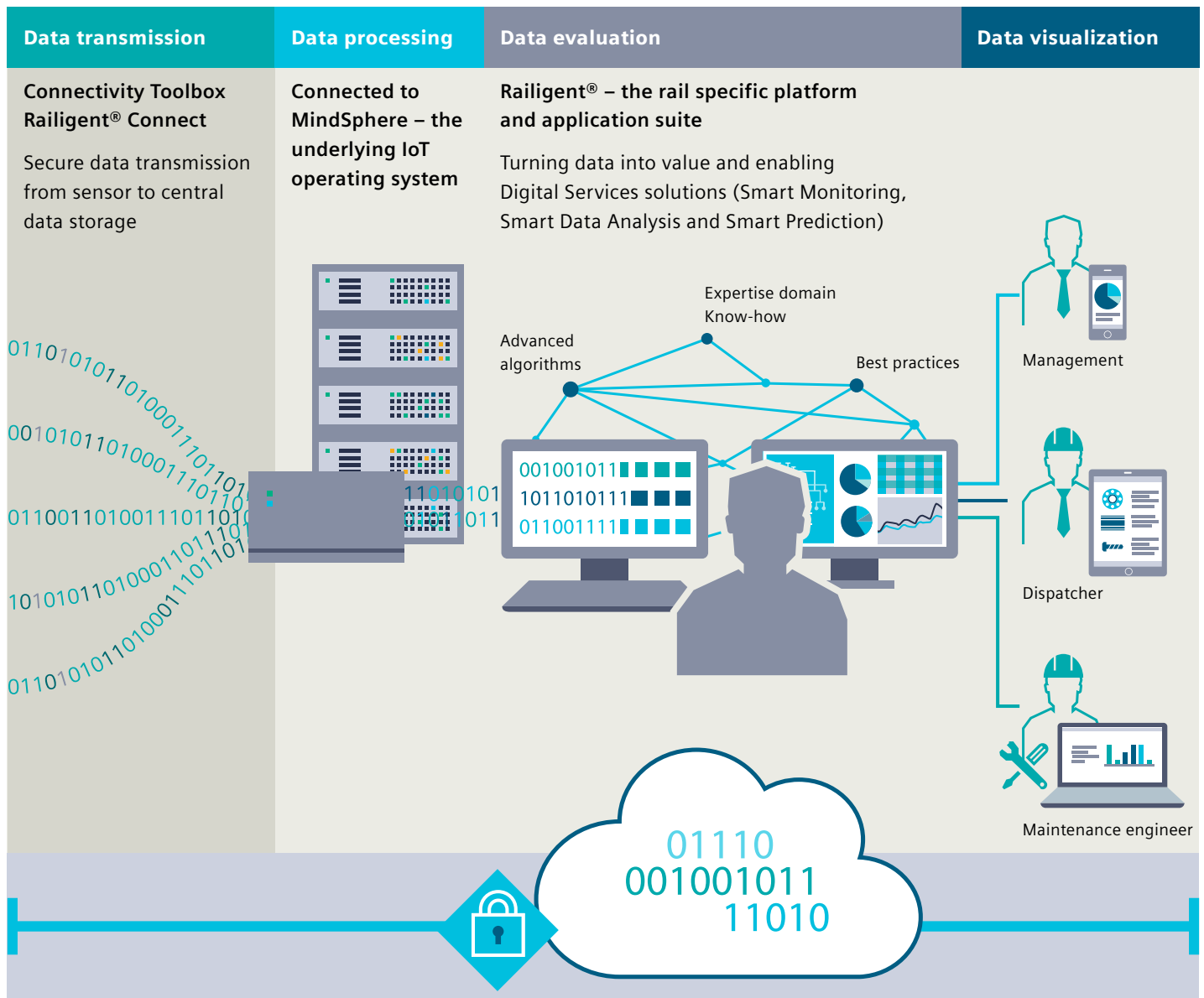
Optimizing Your Workflow with VEMS

This combination of precise, highly reliable data collection with algorithm-based evaluation opens up entirely new perspectives in maintenance. Impending wear-related component failures are detected and can be fixed in good time. While the train is still on its way, a work order is automatically generated and sent to depot operations. Workers are notified of upcoming tasks; what has to be done, where and when. The warehouse gets informed which parts and tools need to be available at which track. As soon as the train arrives at the depot, everything is ready. After the work is complete, VEMS re-check all components and ensure that the planned measures have been successfully completed.

All of this typically reduces tasks that previously required 1–2 hours to a streamlined workflow of a few minutes. Provision of all parts, tools and experts already saves about an hour and can be organized even while the train is still in operation. Maintenance alerts open up additional scope for planning and coordination early on. The fleet's overall availability is thus heightened and secured.

The benefits of VEMS and Railigent®

- Data analytics: complex analytic models allow for precise prediction of component wear.
- Data integration in existing maintenance management systems is the basis for an automatic workflow.
- Data visualization enables the understanding of the current situation and supports root cause analyses.
- Value-add analytics: greater analytic depth through additional data sources, e.g. train data that are analyzed together in Railigent®.

Data transmission	Data processing	Data evaluation	Data visualization
Connectivity Toolbox Railigent® Connect Secure data transmission from sensor to central data storage	**Connected to MindSphere – the underlying IoT operating system**	**Railigent® – the rail specific platform and application suite** Turning data into value and enabling Digital Services solutions (Smart Monitoring, Smart Data Analysis and Smart Prediction)	