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## VEMS for visual inspection

Flexible solution to reduce maintenance costs while increasing operational safety

**Regular maintenance is the prerequisite for reliable and safe rail traffic, yet maintenance tasks are a defining cost factor. The greatest potential for more efficiency lies in maintenance management – if you can identify pending tasks during operation, you can plan ahead and complete the necessary workflow more efficiently. This was our motivation for developing the Vehicle Equipment Measurement System (VEMS) for visual inspection.**

### How does it work?

VEMS for visual inspection (VIS) allows customers to carry out a virtual exam while the train is still in service. This way the vehicle's integrity can be checked and component measurements automatically acquired and analyzed as it passes through the system. These measurements generate a complete digital twin which streamlines the maintenance workflow.

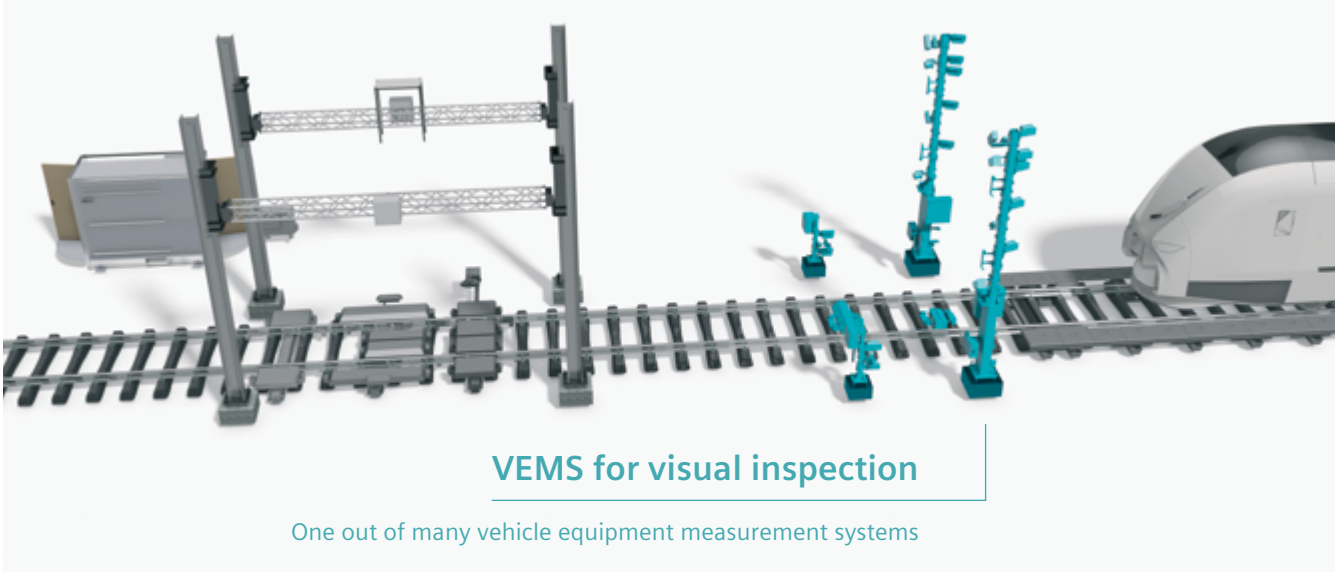
Specific equipment can be identified for monitoring by VIS, which can identify any missing components, damage, or non-conforming equipment dimensions – even graffiti or damaged paintwork.

If new issues are identified, a retrospective check of the last passage of every train can be searched to see if the same problem affects other trains within the fleet.

Users can identify maintenance tasks which they wish to have automated. The installed hardware will be configured to measure these tasks. The system is scalable and flexible and can automate the process of identifying missing or damaged parts, dimensions and separation of parts, graffiti and stains. VIS can be enhanced by adding further capabilities via software updates.

### Your benefits at a glance

- Significantly more efficient than manual inspection
- Time savings thanks to inspection en route
- Increased safety – replaces physical inspection
- Trend analysis for predictive maintenance
- Historical image records for event reporting or engineering analysis



## VEMS for visual inspection

One out of many vehicle equipment measurement systems

### Putting it into practice

Manual visual inspections used to take a lot of time. After a train arrived at the depot, it had to be powered off and isolated before inspections on the roof or underfloor could take place. A gantry or pit may even have been required. VEMS for visual inspection eliminates all of this effort. Instead, all inspections can be performed while the train is in operation. Prior to the actual servicing or maintenance, work steps can be automatically scheduled, so they only require a fraction of the time. This immediately increases train availability.

In addition, comparison with historical data enables increasingly precise predictions of component service life. Maintenance intervals can be adjusted to these insights – without compromising safety – and fleet availability enhanced further.

The complete record of the digital twin also allows analysis to be performed on fleet surveys for engineering and maintenance improvement purposes.

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Last but not least, VEMS for visual inspection provides a quick overview of performed maintenance measures, ensuring that all trains leaving the depot are fully fit for service.

A Thermal Trace Measurement System can be integrated to provide accurate temperature measurements of components, such as the gear box, radiators and motors, brake and axle-end box.

### Seeing more and saving time

Thameslink, a 68-station route in the British railway system, was looking for a flexible solution that could grow with their needs. We identified a number of equipment failure modes that needed measurement or detection. Two high-resolution cameras and the associated lighting system now take multiple images of the side underframe along the entire passage of a unit. This reliably detects incorrect ride heights of vehicles, missing battery container covers, or missing effluent tank caps which otherwise would have remained defective for a longer period. Ian Macleod, Fleet delivery Manager at Siemens plc, sums up the project: “We saved a lot of time by avoiding further manual inspections of vehicles once an issue had been discovered. After VIS identified an issue we were able to use the system to ensure the rest of the fleet was okay and available for operation without removing them from service.”

### In a nutshell

VEMS for visual inspection enables fast, reliable and repeatable inspections. It reduces overall maintenance costs while increasing operational safety.