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Train Scanner

The Service Product Developed by VR FleetCare to Automatically Detect the Condition of Trains in the Future

The Finnish rolling stock maintenance company VR FleetCare has launched Train Scanner, a new service product designed to automatically inspect the external condition of trains.

In addition to enhancing inspection activities and improving safety, the objective of using Train Scanner is to lower the lifecycle costs of rolling stock. With the help of automated scanning, inspecting the train's condition will be quicker and the inspection quality will improve.

Up until now, VR FleetCare's Train Scanner has only been used in passenger trains but due to its scalability, the device can be used to inspect any rolling stock. In border control, for instance, Train Scanner could be used at border stations to automatically detect whether the size of a wagon adheres to the local instructions or used to verify the safety of wagons.

Machine Doing the Work

A large part of rolling stock maintenance is manual inspection performed by human eyes, and the

objective is to proceed towards automated and systematic processes.

Train Scanner is based on machine vision, shape recognition and artificial intelligence. The train's sides and roof are scanned using a line camera with very high line rate speed and resolution. The resolution is approximately a few millimetres. The data from the scanner is instantly processed by means of edge computing that analyses the data and reports any deviations. The information is available to the owner and maintainer of the train within 10–20 minutes. The data is

also stored in a cloud service for further analysis.

First Scanner for Customer Use in June

Train Scanner has now been piloted for one year and in June, the first customer will implement the device. In the future, the commuter FLIRT trains in Helsinki will be inspected by driving the trains past the scanner.

Project Manager Samuli Suuriniemi from VR FleetCare explains:

“The line rate speed and resolution of the camera could be compared to photo-finish cameras used in sports competitions, for instance. We have taught the device how a train should look so that it can detect any possible deviations. Artificial intelligence becomes increasingly more accurate based on the feedback it receives from humans. The final objective is to be able to reliably detect any rolling stock malfunctions in such a way that human-performed inspections are no longer needed. The time saved can be used to repair the malfunctions instead of searching for them.”

The algorithm’s accuracy is developed and improved every time a train passes by.”

“The device is now ready for its first customer. The technical solution that we used to begin the pilot was working extremely well, and the imaging technology that we implemented during the pilot is still being used now. Our most recent development includes making installation easier and weather-proofing the device,” Suuriniemi says.

Affordable and Easy to Implement

By using the scanner, it is possible to standardise the inspection of train exteriors. Because the inspection is always uniform, automated scanning also improves the reliability and quality of inspection.

“There are various benefits related to implementing the system. The condition of rolling stock is constantly assessed, and safety is improved as the system can detect the malfunctioning components of a bogie, for example. By utilising the available data, it would also be possible to accurately define maintenance intervals. Inspection intervals could also be easily increased,” Project Manager Samuli Suuriniemi from VR FleetCare says.

Train Scanner is not a completely unique invention. A few devices with similar user purposes already exist on the market.

“The prices of the devices available on the market are quite high, and their installation requires extensive construction work. Our intention has been to develop a cost-effective solution that is scalable and possible to implement quickly,” Vice President of Digital Services Mihail Lipiäinen from VR FleetCare explains.

“Automated inspection of rolling stock will be one of the most important changes made possible by the current technology, and the benefits for the owner of the rolling stock include improved quality of maintenance and better usability of the rolling stock. Based on the results obtained so far, we know that the technology is working, and we can provide Train Scanner to our current and new customers during the year 2021,” Lipiäinen believes.

Train Scanner as a Service Product:

- As the owner of rolling stock or maintainer of tracks, you certainly want the rolling stock on the tracks to be safe, well-functioning and clean in appearance.
- The solution is an easy-to-install and deployable open service that is affordable compared to the benefits gained. Train Scanner is suitable for the observation of all types of railway rolling stock.
- 6,600-millimetre-high poles with scanners are installed on both sides of the track and used to scan the train that drives by. By using the collected data, it is possible to automatically detect deviations, such as broken parts, graffiti or incorrect loadings.
- The technology of the scanner poles scans the train’s roof, bogies and vehicle group from both sides. The resolution is approximately a few millimetres.
- Train Scanner decreases the amount of manual work and allows you to inspect large amounts of rolling stock

accurately and efficiently. The device makes it possible to proceed from reacting to prevention in the repairing of rolling stock malfunctions.

- Train Scanner can be integrated into the customer's existing systems. Reports can be adapted to suit the customer's individual needs.
- Train Scanner can be installed practically anywhere with trains passing by.
- Train Scanner can be used in different speed limit areas, but the best and most accurate results are achieved when scanning trains driving by at a lower speed.
- Implementing Train Scanner enhances inspection activities and improves inspection quality.



We are on the same track



150

years of experience

1000

top tier experts

100

different types of rolling stock

1500

different components

400

rolling stock units under condition monitoring

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