

PSI
Technics

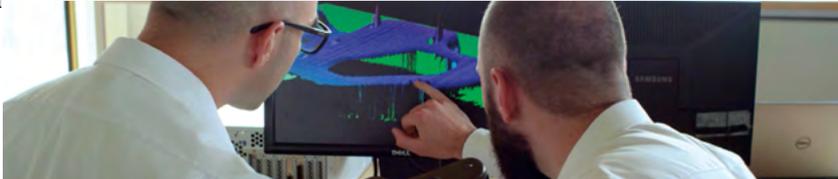
2 000500 999000

AUTOMATED TRAIN INSPECTION

**Modern Camera Technology Significantly Reduces
Train Maintenance Intervals and Costs**

From detecting wear and
tear to data analysis –
PSI Technics offers an
advanced maintenance
solution





Reduce Maintenance Costs with DA-MI-KA, Our Automated Visual Camera Inspection Technology for Multiple-unit Trains

Technological systems require daily maintenance to ensure that they live up to the strictest safety and performance requirements. Train maintenance is generally performed in regular intervals by specifically trained personnel to ensure a long service life and to keep component wear and tear to a minimum. Inspections are usually carried out by qualified technicians. But people can make mistakes.

PSI Technics offers sophisticated and fully customizable camera solutions that complement or even replace visual and manual tests and inspections.

PSI Technics' industrial image processing solutions use camera technology and laser sensors. They are ideal for automated maintenance workflows, guarantee a safe operation and maximum performance. They significantly increase the inspection quality while drastically reducing maintenance intervals.



Advantages of Using Camera Technology

- >> Optimized workflow and maintenance processes
- >> Automated inspections ensure safe operation and prevent failure-related downtimes
- >> Early detection and automatic analysis of defects and damages
- >> Reduced costs for manual measurements and visual inspections
- >> Increased quality and productivity
- >> Tremendous cost savings due to significantly reduced maintenance intervals and service downtimes
- >> Increased customer satisfaction

The DA-MI-KA Solution

Our engineers developed the **camera-based DA-MI-KA roof inspection system** to enable an automated, condition-based maintenance for multiple-unit high-speed trains.

DA-MI-KA records any roof damages of the train that passes below the system, for example, when it enters a depot or drives through a dedicated "inspection tunnel". The recorded data is sent directly to the DA-MI-KA analysis software.

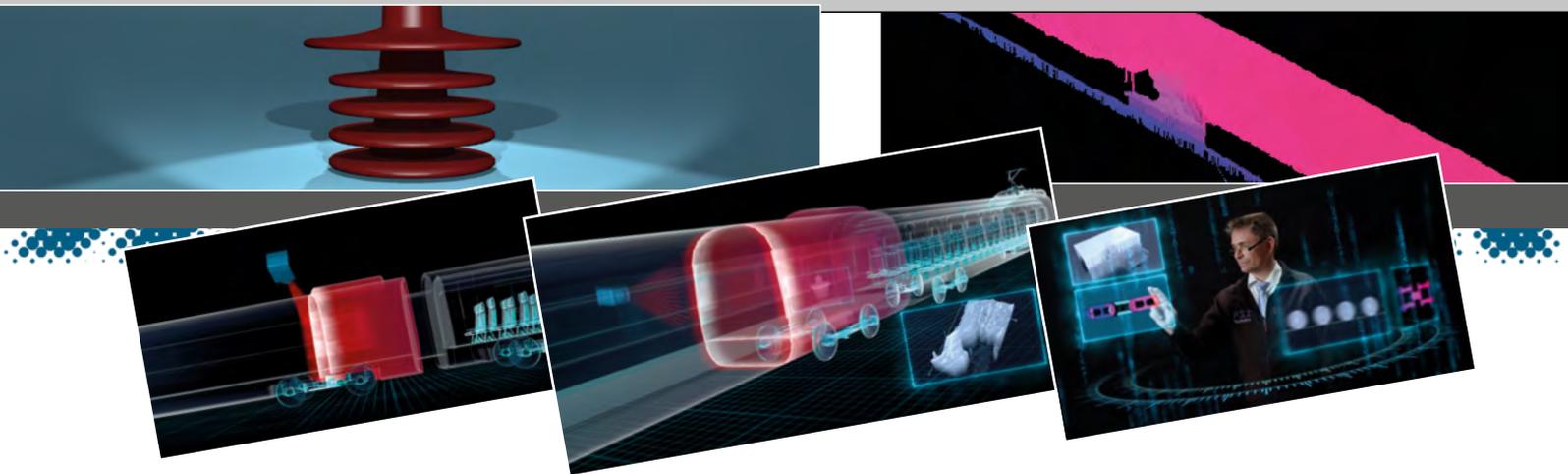
The Challenge

Typically, the roof of a multiple-unit train (MU) is inspected by specially trained and certified personnel. Prior to performing the inspection, the train and the overhead line have to be grounded to avoid any high-voltage safety hazards. Due to the number of required safety steps, the grounding process is time-consuming and the maintenance personnel has to cover long distances.

To reduce the required inspection time and enhance the inspection quality, we developed DA-MI-KA to automate the roof inspection process. The automated camera-based system provides detailed visuals and requires no previous grounding.

The Solution

DA-MI-KA optimizes the maintenance workflow. Roof inspections can be carried out on a regular basis and in significantly less time. During the planning stage the feasibility of the roof-inspection project is assessed on-site, where processes, workflows and requirements are identified. Specific test components are selected and appropriate diagnostic methods for the components are determined before the system is installed and commissioned.



DA-MI-KA ADVANTAGES

WITHOUT DA-MI-KA	WITH DA-MI-KA
Additional safety measures, for example, the grounding of the rail cars and the tracks are required before the visual inspection can take place.	Images of the train roof are automatically recorded while the train passes below the DA-MI-KA system.
The inspector needs to get on the train roof to examine and inspect it for damage or wear.	The roof structure is analyzed automatically. The inspector displays and checks the analysis results using a web interface.
For the time of the inspection the train occupies a track in the maintenance shop.	If the roof is in good condition, the train can remain in service and does not need to be transferred to the maintenance shop.
Inspection time: 1.5 hours	Inspection time: 10 minutes
The train occupies a maintenance shop track.	Thanks to DA-MI-KA, the maintenance shop is freed up for other maintenance-related tasks

DA-MI-KA system modules

for a variety of inspection and measurement tasks are available, such as:

- Pantograph wearing strip measurements
- Roof surface inspections
- Pantograph inspections
- Insulator inspections
- Antenna inspections
- Cable and conductor line analysis
- Inspection of covers, such as climate covers
- Inspection of bolted joints/connections

Examples for recorded potential damages or defects: Indentations, spalling, cracks, single fiber or strand breakage, deformation, displacement, loose bolts, contact burns, missing components.

The diagnostic software uses taught-in templates to automatically check predefined test components for defects or damages. This technology can be used to inspect and analyze components of any kind.

Inspection example: Damaged wearing strips

Synopsis:

- >> The track in the maintenance shop is freed up for other tasks
- >> The results are documented for subsequent reporting and follow-up
- >> Defects and creeping wear and tear are identified
- >> Significantly reduced inspection times
- >> Time-delayed roof analyses can be performed
- >> Enables an efficient, condition-based maintenance



Broken-out parts of a wearing strip section



Above: Elevation map created by a laser line scanner



Below: 3D rendering of the recorded data



AUTOMATED TRAIN INSPECTION

Conclusion: Reliable Camera Systems Guarantee Operational and Process Stability

How it works:

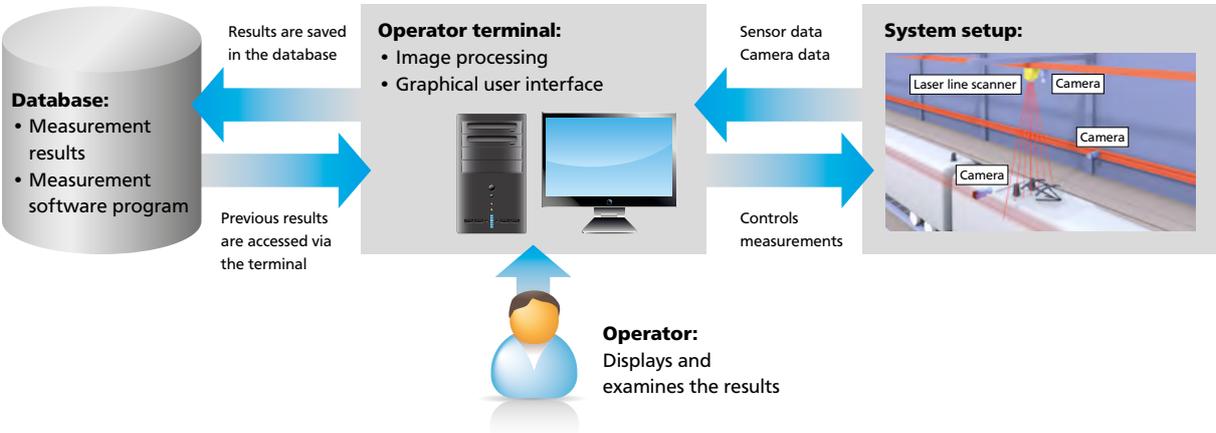
Images of the train roof are recorded while the train passes below the system. The diagnostic software analyzes the recordings and displays the results within 10 minutes. The rendered images are accessed via the corresponding **web interface** that offers the following features:

- Display of the analysis results
- Individual image display
- Adding inspection notes to the analysis results
- Reporting feature
- Documentation of results

The software uses templates to learn the characteristics of each train type and the analysis is performed using pre-defined templates.

DA-MI-KA analysis data can be used

- For the compilation of statistics
- To identify creeping wear
- The data is portable and can be easily transmitted if certain maintenance services need to be performed at different locations
- For condition-based maintenance
- To create inspection templates for additional train models
- For process optimization



OUR SERVICES

We assist you every step of the way – from concept to completion. We focus on a close cooperation with our customers to provide the right solution for your production environment. We provide an in-depth consultation, evaluate and analyze your imaging project on site.

We develop prototypes for integrating the ideal camera solution and safely commission the system. We guide you through the process, perform maintenance services to ensure that your image processing system works dependably and consistently. The benefits of industrial image processing include improved product quality and an enhanced reliability of multiple-unit trains.

Would you like to receive additional information on how to make your processes more efficient? Email us today at

info@psi-technics.com

PSI Technics GmbH

support@psi-technics.com
www.psi-technics.com/E