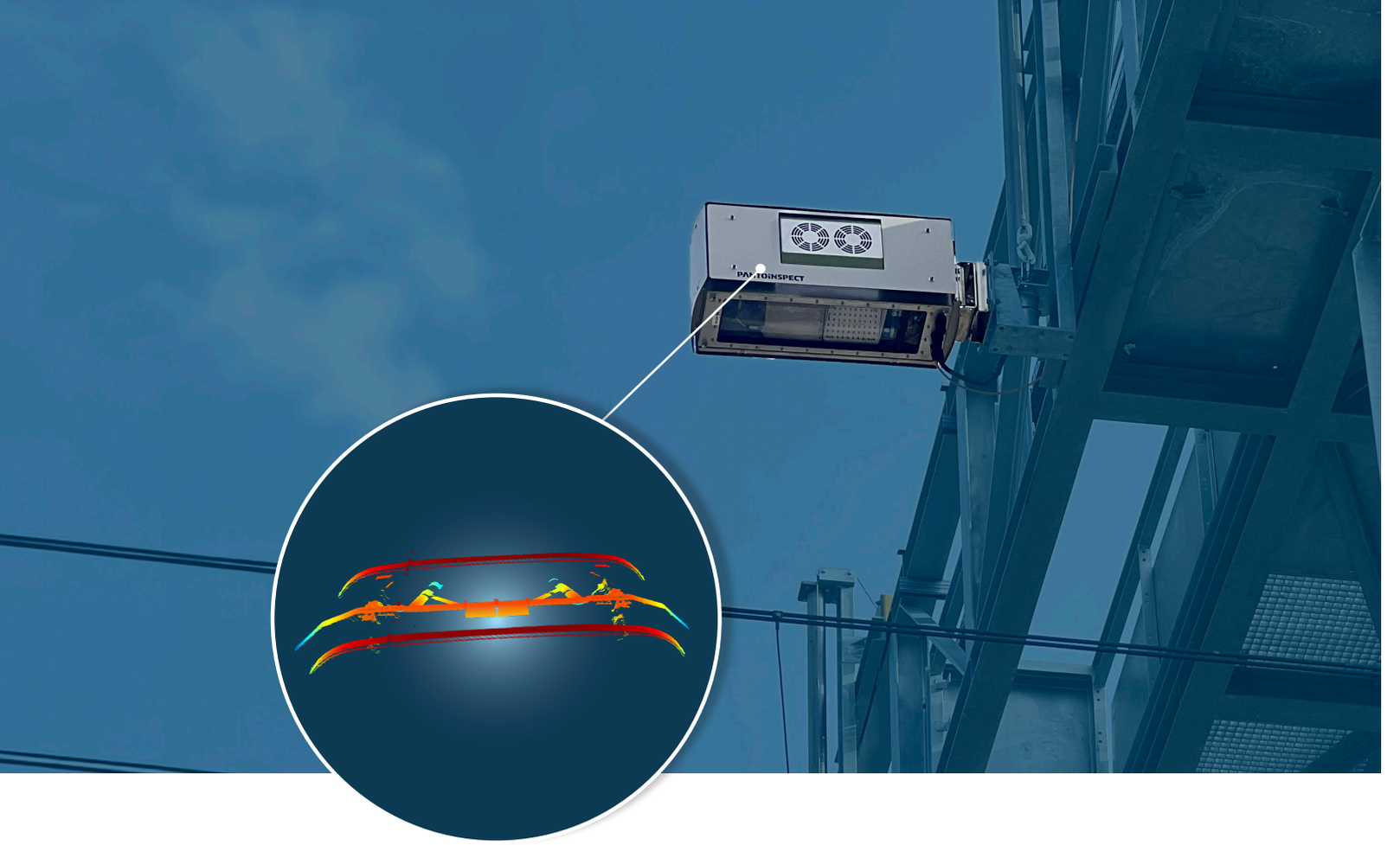
Fully Automated & Real-time Pantograph Monitoring

PANTOINSPECT



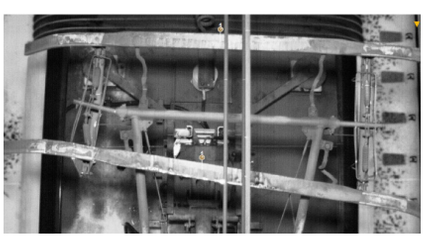
Accurate and Reliable Technology for Pantograph Monitoring

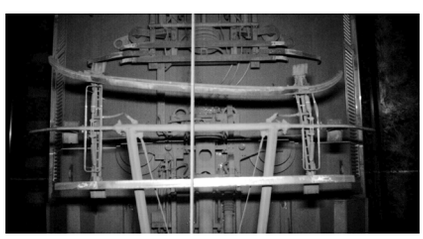
The PantoSystem is the industry's most accurate and reliable measurement technology for automated wayside pantograph monitoring.

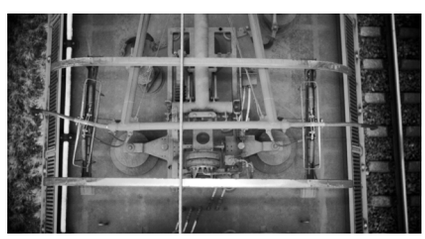
The system uses a combination of AI, advanced algorithms, and ultra-high-speed 3D laser scanner for fully automatic recording, analysis, condition measurements and detection of broken pantographs. This enables you to take the appropriate action to prevent damages to the infrastructure such as a teardown of the overhead contact line.

The PantoSystem helps to keep the trains running and provides valuable data to enhance fleet performance.

Examples of Damages Caught by the PantoSystem:





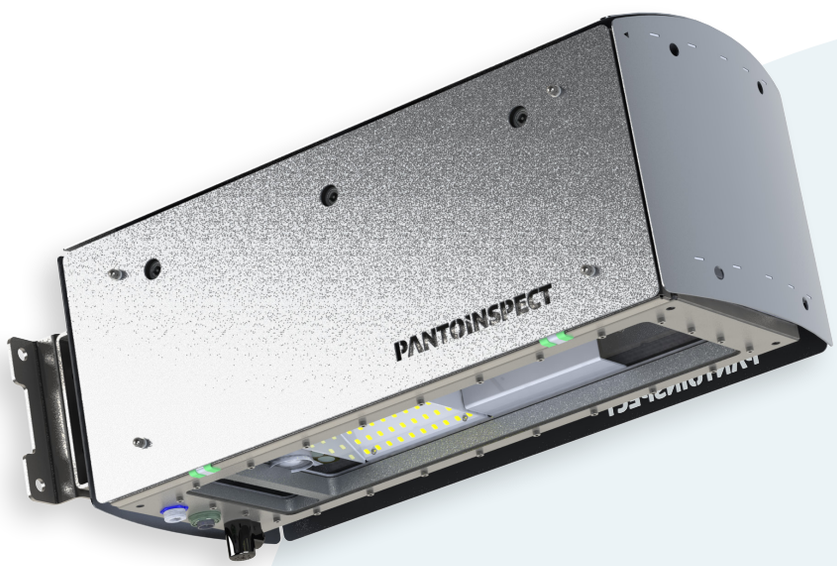


High-performance and Robust PantoScanner

The high-performance and robust Mark 6 PantoScanner uses a combination of 3D laser triangulation and high-speed cameras to capture automated and real-time 3D data and 2D images. A complete evaluation of the condition of passing pantographs is provided for all bi-directional trains running up to 350 km/h. With 3D laser triangulation, the PantoScanner offers the industry's most detailed and accurate measurement technology for recording of pantograph data.

The PantoScanner uses both 3D laser and filter which ensures the performance, regardless of the weather condition.

Every time an electrified train passes underneath the scanner, 2D images of the pantographs are captured and a 3D image is generated. This provides the operator with a full overview of the condition of the pantographs, which is useful in case of an alarm. Data on train passages such as train and vehicle identification are also recorded by the scanner via RFID or API-connection. All data captured is sent to the PantoServer for analysis. The scanner also handles events and sends error alarm messages to the PantoServer.



The PantoSystem enabled RATP to realize a huge cost savings of more than 100.000 euros per year for the fleet of one RER line, meaning a total of more than 200.000 euros. RATP is planning to extend the coverage of automatic Pantograph monitoring across their network in the future.

– Marek Benaïche, PROJECT MANAGER, RATP, FRANCE

PantoInspect was chosen by the eHighway team because the company has the advanced technical expertise, and many years of proven track record in supplying some of the major infrastructure owners and rail operators in the global railway industry. The PantoSystem was very beneficial for the eHighway project since the team considered it as an all-in-one system that combines both a camera system and a laser system.

Werner Pfliegl
PRODUCT MANAGEMENT, SIEMENS MOBILITY GmbH – EHIGHWAY, GERMANY

SIEMENS

FEATURES

Supported velocity	**Over 350 km/h**
Resolution	**1 mm**
Weight	**~45 kg**
Dimensions	**L: 812 x W: 380 x H: 375 mm**
Bi-Directional	
Ambient Temperature	**-40°C to +50°C**
Ambient Humidity	**Up to 98%**

DETECTION OF PANTOGRAPH DAMAGES

- Missing Carbon
- Edge Chip
- Abnormal Wear
- Missing and Displaced Horns
- Carbon Detachment
- Uplift Displacement and Force
- Yaw, Roll and Pitch Angle
- Carbon Thickness

Proven End-to-End Solution for Pantograph Condition Monitoring

Our powerful software is a proven end-to-end solution that uses advanced machine learning algorithms for pantograph condition monitoring. All measurement data captured from train passages can be fully visualized and validated by the operator. It also enables 3rd party integration via API, allowing you to integrate and share data from the PantoSystem with various other systems and applications. PantoInspect also offers hassle-free hosting of the software so that you can concentrate on your core business.

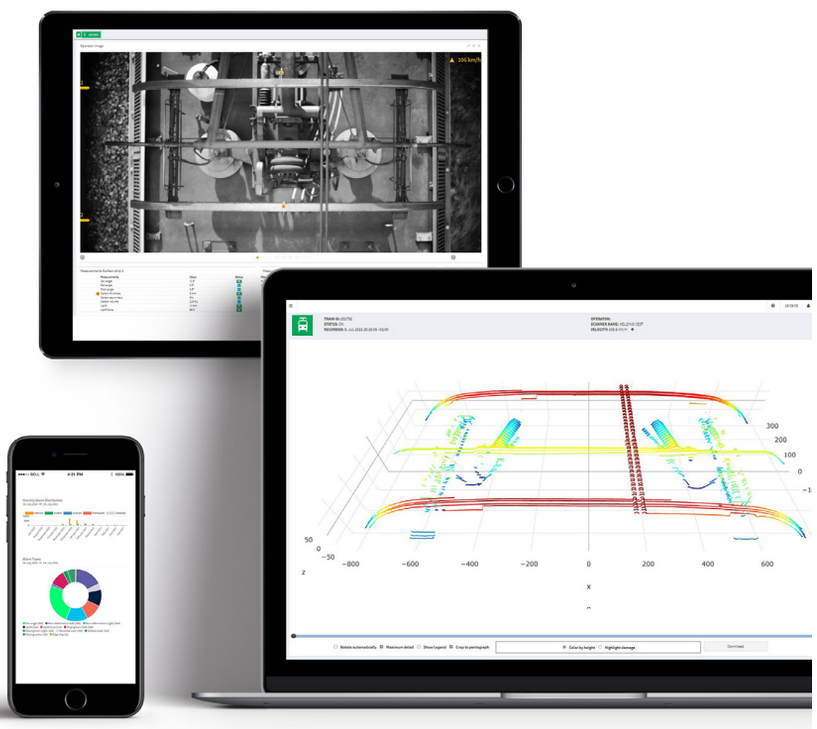
FEATURES

- Automatic Analysis (No human evaluation)
- WebClient (Rich web-based user interface)
- RoofCam (images of entire roof)
- API (Easy external integration)
- Alarm Handling
  (Intuitive and flexible alarm flow)
- Damage Visualization
  (3D color coded representation)
- Statistics (Big data mining)
- Language (Supports all major languages)

The Systems have identified damaged pantographs that needed immediate actions, to avoid possible overhead wiring breakage. Our estimate is that it is very likely, that by taking certain pantographs out of service, the worst incidents have been avoided. Possibly generating a significant return on investment.

Glenn Van Calster
ELECTRICAL ENGINEER, INFRABEL, BELGIUM

INFRABEL



User-friendly and Feature-rich WebClient

The user-friendly and feature-rich PantoClient is a cloud-based WebClient platform which connects to the back end of the PantoSystem. Real-time insight on the condition of all pantographs, and a flexible alarm handling procedure are automatically accessible to the operator. Advanced data analysis can also be carried out to support predictive and preventative maintenance and improve operational decision-making.

All Browser Enabled Devices
You can instantly access the WebClient from any internet-connected devices such as desktop computers, mobile phones and tablets.

Live Imaging & 3D Scan
For every train passage and alarm, photos and a 3D scan are automatically generated. This enables you to accurately monitor and detect the severity of a pantograph damage.

Statistics & Reporting
A powerful statistics tool enables you to conduct pattern and trend analysis on your entire fleet of trains and pantographs. You can also export and store statestical data generated by the PantoClient and create reports to share with the rest of your organization.

User Roles & User Groups
You can easily assign administrator, user, and observer roles via the WebClient. This enables you to delegate tasks and enhances team collaboration.

Tagging of Train Passages
A tag, similar to a hashtag, can be added to any train passage, in case a pantograph damage requires attention. This makes it easier to search and share a collection of train passages.

Multiple Language Support
The WebClient incorporates multilingual options for your individual preferences.

Audiovisual Alarm Notification

The PantoAlerter is an audiovisual alarm notification device. It communicates with the API through WI-FI or wired Ethernet. A buzzer and colored flashlights are used to notify the operator about the severity of an alarm. It can be configured through a built-in web server or be connected to your own WebClient. The PantoAlerter can be placed anywhere on your desk, allowing you to visually monitor alarms generated by the PantoSystem, meanwhile managing other work tasks.

The PCMS has assisted Sydney Trains with the efficient operation of Australia's busiest railway –helping to minimise delays to the millions of customers who use our network each week and to optimise fleet maintenance practices.

GROUP LEADER,
TRAIN CONDITION MONITORING SYSTEMS

Transport Sydney Trains

PantoInspect is committed to continuously invest in research and development, using the latest technology to deliver innovative products to support the digitalization of the Rail industry – Doing things smarter.

Malte Breiting
CEO OF PANTOINSPECT

About PantoInspect

PantoInspect, part of the Image House Technology Group, is a Danish company specialized in advanced industrial vision technology for automated pantograph inspection. PantoInspect was the first company world-wide to develop an automated pantograph inspection system in 2008, in cooperation with Banedanmark, the Danish infrastructure manager.

Today, the company is a world-leading manufacturer and supplier of automated and real-time wayside pantograph monitoring systems, serving some of the leading infrastructure owners and train operators such as Deutsche Bahn, RATP, PLK, Infrabel, Sydney Trains, Network Rail, ÖBB, TRA, Banedanmark and Aarhus Letbane. With the industry's most robust and accurate measurement technology, PantoInspect helps infrastructure managers protect their infrastructure and improve fleet performance. The system also enables train operators to improve operational efficiency, and avoid service disruptions, meanwhile increasing safety and ensuring customer satisfaction.

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