camlin rail

EMPOWERING SMART MAINTENANCE

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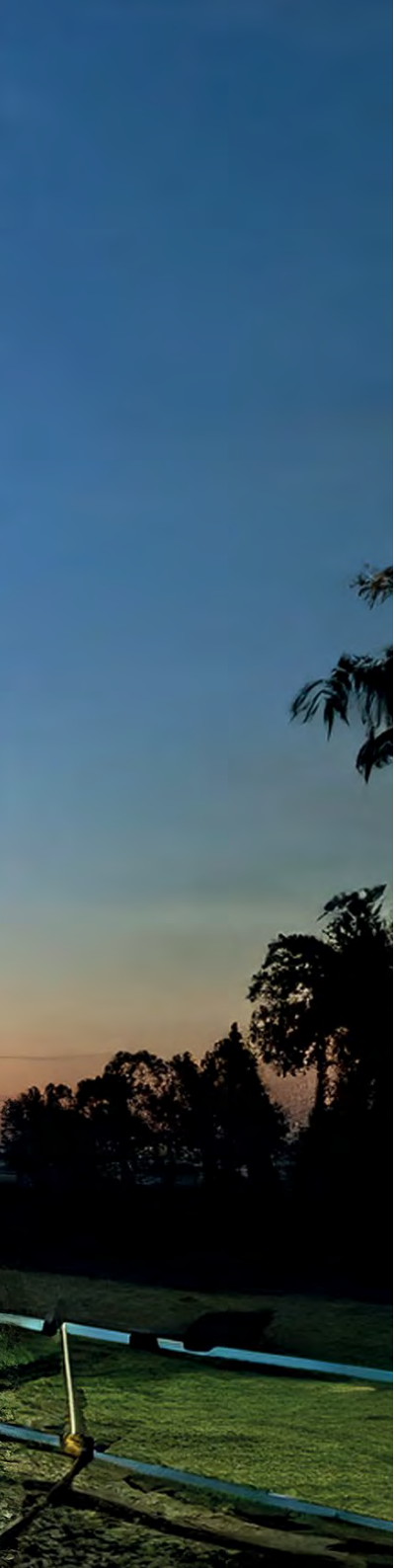


Contents

Advanced analytics is going to make condition-based maintenance an attractive lever for increasing maintenance efficiency. With efficiency gains of 10 to 15% expected, it is estimated that the global maintenance market can save up to EUR 7.5 billion per year by moving towards condition-based maintenance.

McKinsey Report 'The rail sectors changing maintenance game'

Redefining Fleet & Infrastructure Monitoring

Introduction

Camlin Rail is part of the Camlin Group, with a worldwide presence and facilities in 21 cities across 17 countries. At Camlin, our goal is to optimize the critical infrastructures that people, cities and communities around the world depend on, all day and every day.

As these networks get bigger and more complex, they're becoming exponentially harder to manage. And that's why we're here - to make the world's energy and transport infrastructures run more efficiently, ultimately helping our customers keep the lights on and keep passengers moving.

At Camlin Rail, we're driving sustainable efficiencies and performance success for railway networks and operators. Our fleet and infrastructure monitoring systems keep trains running in peak condition while reducing operational costs.

Our asset monitoring solutions – including the world's first intelligent 3D pantograph monitoring system, are helping rail operators optimise maintenance schedules and maximize fleet availability while enabling staff to work and maintain rolling stock more safely. Our automated reconfigurable power systems maintain supply continuity during extreme fault conditions, enabling railways to keep trains running with less disruption to passenger journeys.

Our solutions are closely aligned with the objectives of the Digital Railway initiative that will bring dramatic enhancements in efficiency, capacity, safety and sustainability to tomorrow's digital railway network. Camlin Rail is proud to have a global track record, successfully deploying our systems across Europe, North America and Asia to help deliver a safer, more efficient and more sustainable railway of the future.

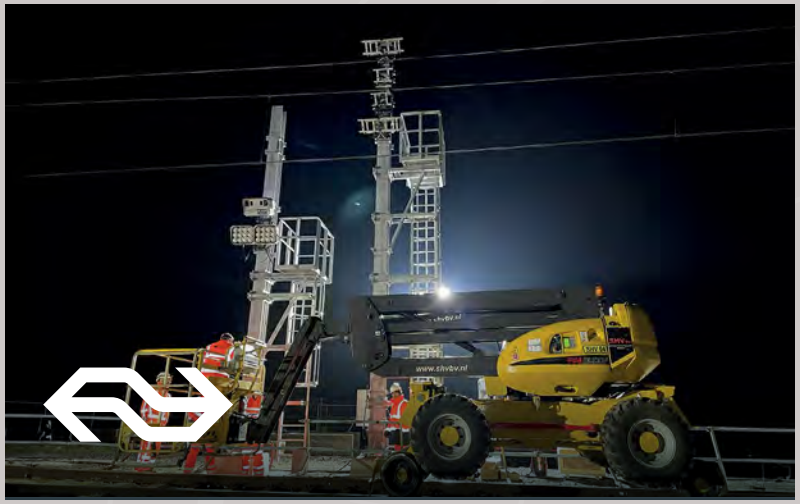
PROJECTS

Heathrow Airport, London
Pantograph Monitoring

Septa, Philadelphia
Pantograph Monitoring

Network Rail, Midland Mainline
Pantograph Monitoring

RFI, Salone
Pantograph Monitoring



NS, Hekendorp
Pantograph, Roof and Bogie Monitoring

Caltrain, San Francisco
Pantograph, Roof and Catenary Monitoring

Network Rail, Great Western Mainline
Pantograph Monitoring

Infrabel, Franière
Pantograph Monitoring

TrainVue

Empowering Smart Maintenance

One of the key challenges faced by train operators is the manual inspection of rolling stock to ensure it is of an acceptable condition to enter the operational railway. This procedure is a mandatory and regulatory requirement which needs to be completed daily. The manual checks are labour intensive and involve several challenges, namely, the inspections can typically only be carried out during the hours of darkness which impacts the safety of maintenance teams and the quality and consistency of the inspection and, the rolling stock being spread across multiple depots requiring extensive use of maintenance teams. TrainVue solves this problem by capturing and analysing images of the rolling stock - at full line speed - and presenting them to the maintenance teams via a secure, web-based user interface. The images are time stamped and correlated with the train (asset) which allows the railway to keep an extensive digital record of asset condition as well as track and trend the condition of components. This approach allows train operators to maximise the availability of their fleets.

TrainVue Benefits

Safer working

Eliminates safety risks to maintenance staff, with no need to manually access top of carriage/power car.

Accurate, repeatable results

Fully automated pantograph inspection workflow provides consistent, highly precise monitoring data.

Reduced risk of line teardown

Protects service continuity, customer revenues and threats to operational reputation.

Maximized fleet availability

Automated, real-time wayside inspection maximizes availability of rolling stock, with no need to take trains out of service.

High resolution images of the lower pantograph structure and its mounting area (panwell) allow the user to manually inspect for damage or foreign objects which may impact pantograph performance.

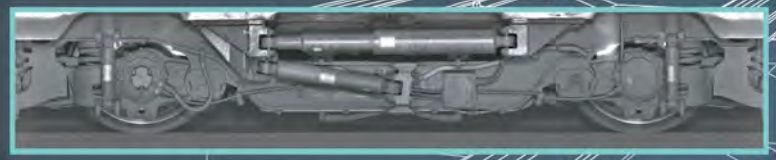
RoofVue

ROOF INSPECTION

CarVue (Bogie)

BOGIE INSPECTION

High resolution images of the bogies are captured and automatically segmented at full line speed. The images are uploaded to the server for manual or automated analysis.



A train borne solution fitted to passenger trains to measure OLE condition (height and stagger) and impact detection to the pantograph head. Alerts are automatically sent to maintenance teams for corrective action.

CatVue

CATENARY MONITORING

PanVue

PANTOGRAPH CONDITION

Stereo cameras capture high resolution images which are used to create a 3D digital twin of the pantograph head. The user is alerted automatically if a pantograph is out of specification.

CarVue (OCR)

TRAIN IDENTIFICATION

TrainVue can utilise two options to correlate the asset to the acquired images:

1. RFID (Radio Frequency Identification. Requires fleet(s) to be tagged to enable this option.
2. Optical Character recognition (OCR) is a cost effective alternative to RFID which automatically recognizes carriage numbers and associates these with the asset.

PanVue

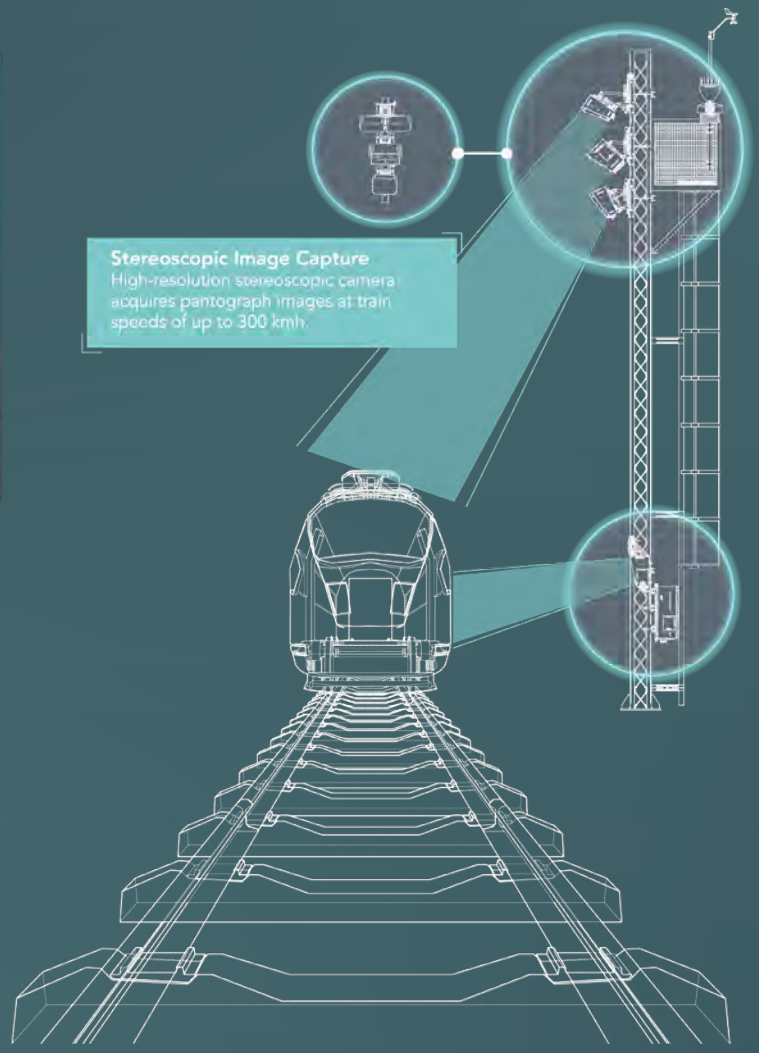
PanVue

PanVue is an industry first in pantograph monitoring by adopting a fully automated machine vision system based on stereo vision. Railways are getting busier and as more demands are placed on the infrastructure, there is a need to deploy automated tools to help drive operational performance. PanVue provides the railway operator with a unique and cost-effective tool set combined with advanced analytics to improve operational decision making.

Our wayside pantograph monitoring system helps railway infrastructure owners, OEMs and train operators optimize maintenance schedules and maximize rolling stock fleet availability.

Successfully deployed by rail operators across Europe, North America and Asia, PanVue uses advanced imaging and machine learning to assess pantograph condition – safely, in real-time and without the need to withdraw trains from service.

We are proud to have ongoing partnerships with the worlds largest railways. PanVue can be flexibly deployed either in either wayside or overhead mounting frame (OMF) configuration – or a combination of the two – to suit railway operators' requirements.



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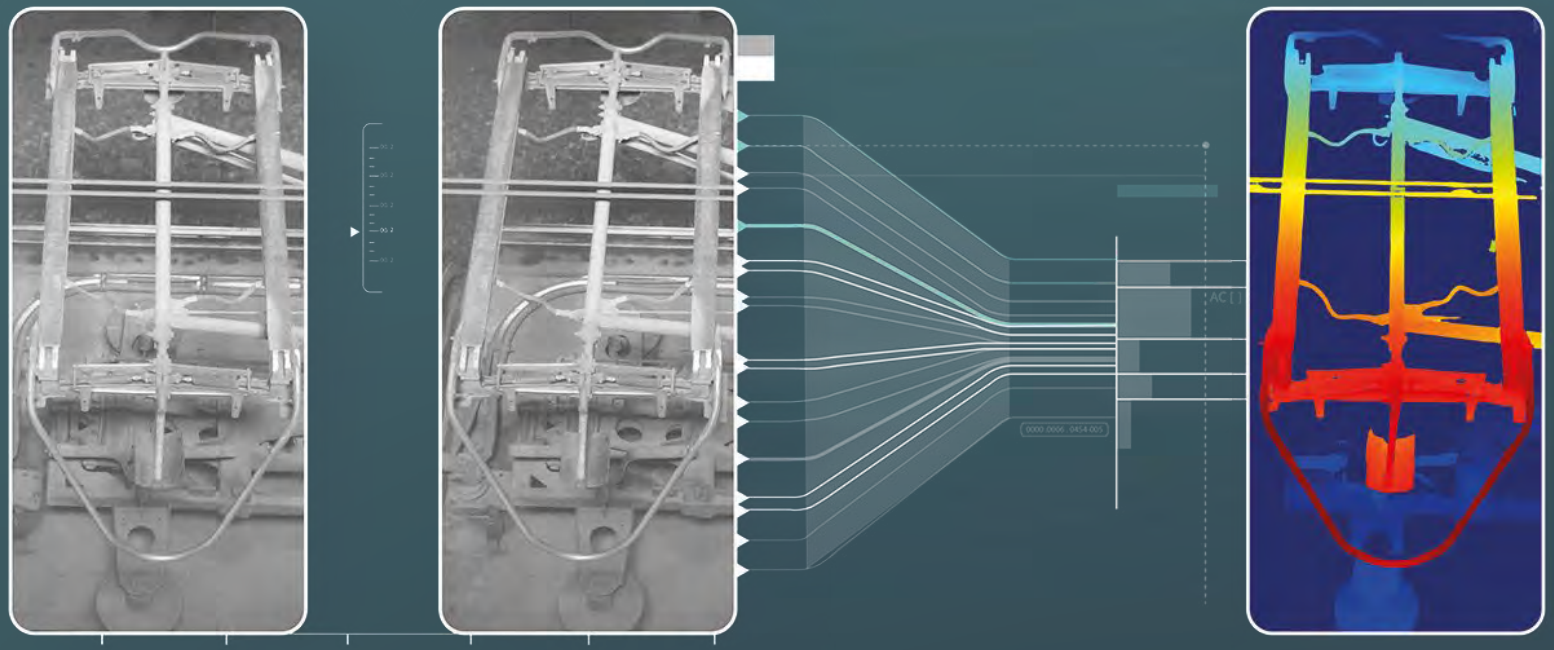


Left Pantograph image

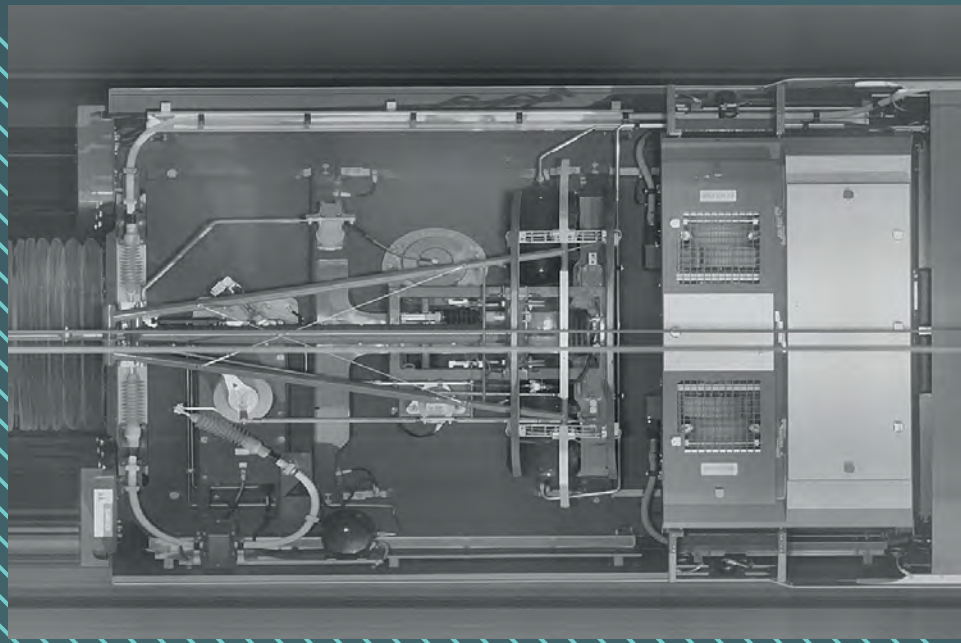
Right Pantograph image

Disparity image reconstruction

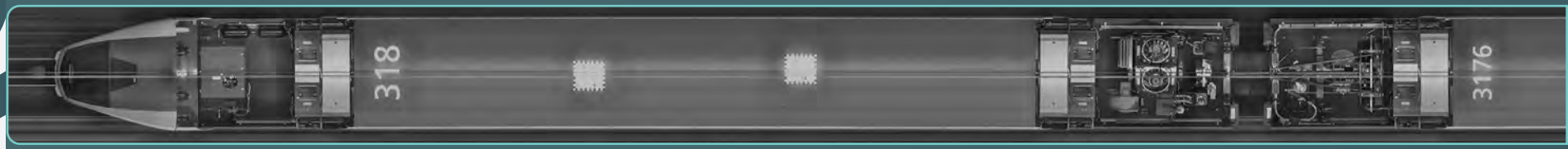
RoofVue

RoofVue

Accessing the roof area of rolling stock is a timely intervention with an inherent safety risk due to working at height. Furthermore, depots need to have the facility available to facilitate roof inspections which is not always possible with inspections are becoming increasingly complex as more equipment is being added to the roof area. RoofVue is a cost-effective solution by providing high resolution images for manual or automated inspection, improving safety and the quality of inspection process.



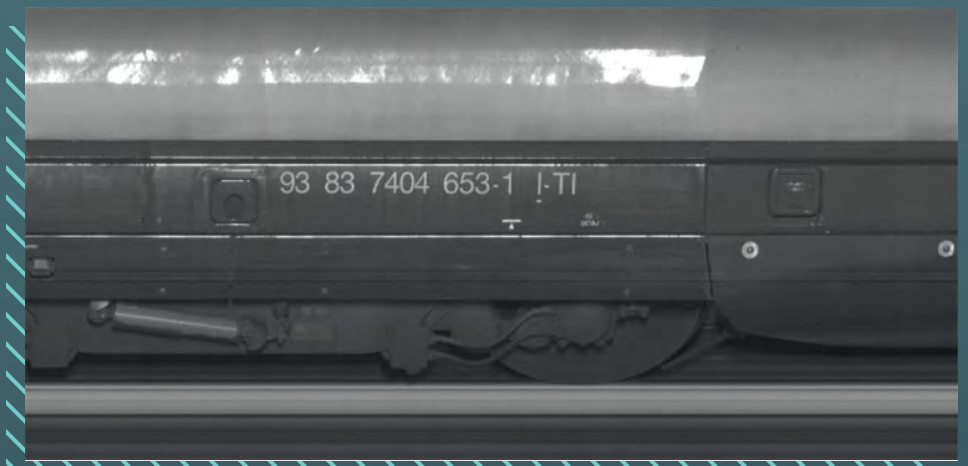
High resolution images of the lower pantograph structure and its mounting area (panwell) allow the user to manually inspect for damage or foreign objects which may impact pantograph performance.



CarVue (OCR)

Manual inspections of the carriage and bogie areas need to be undertaken in the depot, often in the hours of darkness, reducing the quality and consistency of inspection. A range of high-resolution images can be acquired using a combination of CarVue modules to enable manual or automated inspection of the bogie area, carriage condition, open doors and graffiti.

Camlin can provide two options to be able to correlate the train to the pantograph, panwell and bogie scan images. RFID would be the most common technique but, if the railway does not have the rolling stock fitted with RFID tags a machine vision solution is available. MVID (Machine Vision Identification) uses optical character recognition (OCR) to automatically read the train numbers and characters on the side of the train and correlate this information with the acquired images. Train Identification allows the user to track and trend train (asset) performance over time.



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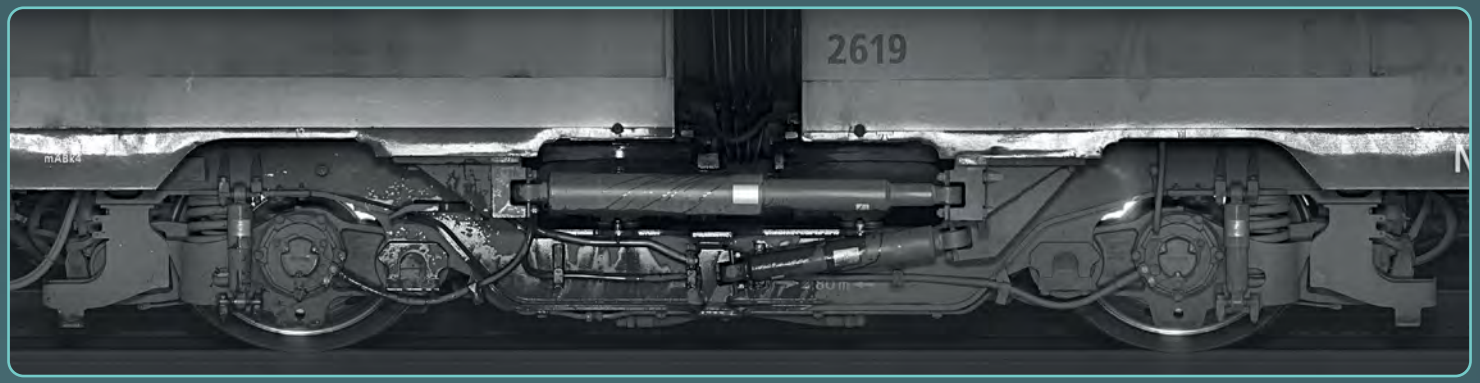
CarVue

CarVue

CarVue (Bogie)

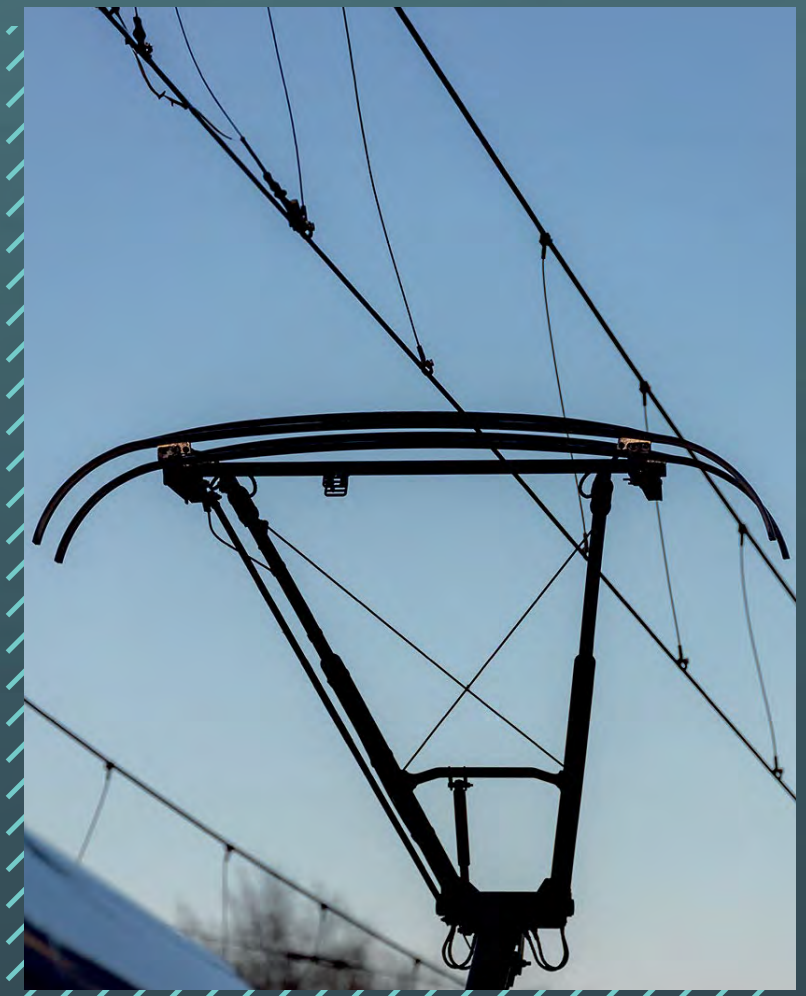
High resolution images of the bogies are captured and automatically segmented at full line speed. The images are uploaded to the server for manual or automated analysis.



CatVue

Trains powered by overhead electric wires require a continuous connection between the contact wire and the pantograph. Loss of contact damages the equipment which can lead to dewirement failures. CatVue uses computer vision technology to reduce the incidence of overhead line equipment (OLE) failures by providing immediate intelligence on the condition of OLE and facilitating better management of the critical interface between conductor wire and pantograph.

CatVue is a step-change from current camera systems by identifying emerging issues before they escalate, causing expensive failure and severe disruption. CatVue uses a roof-mounted camera installed on the train behind the pantograph, capturing images in real-time. These images are then analysed to identify failure or emerging threshold events.



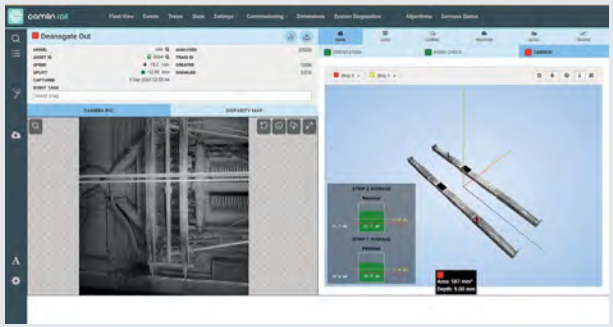
CatVue

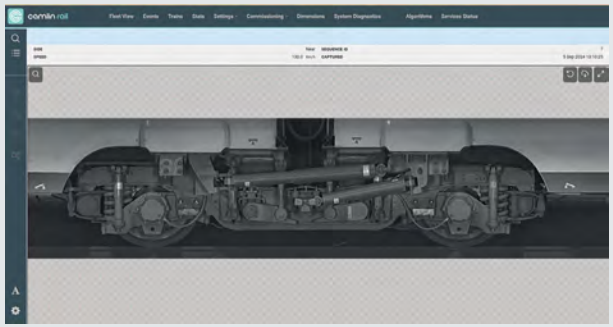
Next Generation Analysis Platform

Embedded web server

Our web-based user interface allows multiple users to access data from a smart device such as a tablet, smartphone, or desktop computer. Designed with the user in mind, the sleek and intuitive display, allows the user to easily understand pantograph condition via high resolution images and supporting 3D analysis.

Camlin appreciate that each user will have different objectives depending on their job function; whether it be infrastructure owner, the train operator, the OEM or a combination of all three, therefore, it is key that the data and statistical reports work for their business. Therefore, Camlin developed 'FleetView', an additional feature which is asset driven and enables the train operator and/or OEM to easily understand the condition of the pantographs across the fleet; understand dynamic carbon wear rates across different pantograph models and external conditions, such as weather. FleetView can support or eliminate the manual inspection of assets by creating a digital record of asset inspection with a further option to automatically create work orders (via end customer API) ahead of scheduled maintenance visits. Statistical analysis of the data helps identify trends, managing risk adds objectivity into the decision-making process. Our software enables the user to configure, run and share .pdf reports based on selected data points to help drive operational performance.





Insight and Analytics

- Simplify information flow via intuitive analytical tools and dashboards
- Drive data-based decisions with key stakeholders
- Improve time to insights with automated reports

Seamless Integration

- Supports asset management workflow
  - Maintenance scheduling
  - Asset tracking
- Enables automatic creation of work orders
- Range of standard and configurable APIs

Asset Management

- Understand true condition of train fleet and catenary
- State of good repair (review)
- Reduce risk with maintenance tracking
- Understand and fleet condition with FleetView app.


camlin

At Camlin Rail, we're driving sustainable efficiencies and performance success for railway networks and operators. Our fleet and infrastructure monitoring systems keep trains running in peak condition while reducing operational costs.

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