

Inspection

Our **Inspection Services** provide a comprehensive, sensor- and measurement-based inspection framework to detect defects across your infrastructure and rolling stock before they become critical.



- Inspection
- Monitoring
- Asset Management
- Data Decision
- Accessories
- Trackwork



SoniQ Rail Explorer
Smart mobile ultrasonic inspection for safer tracks



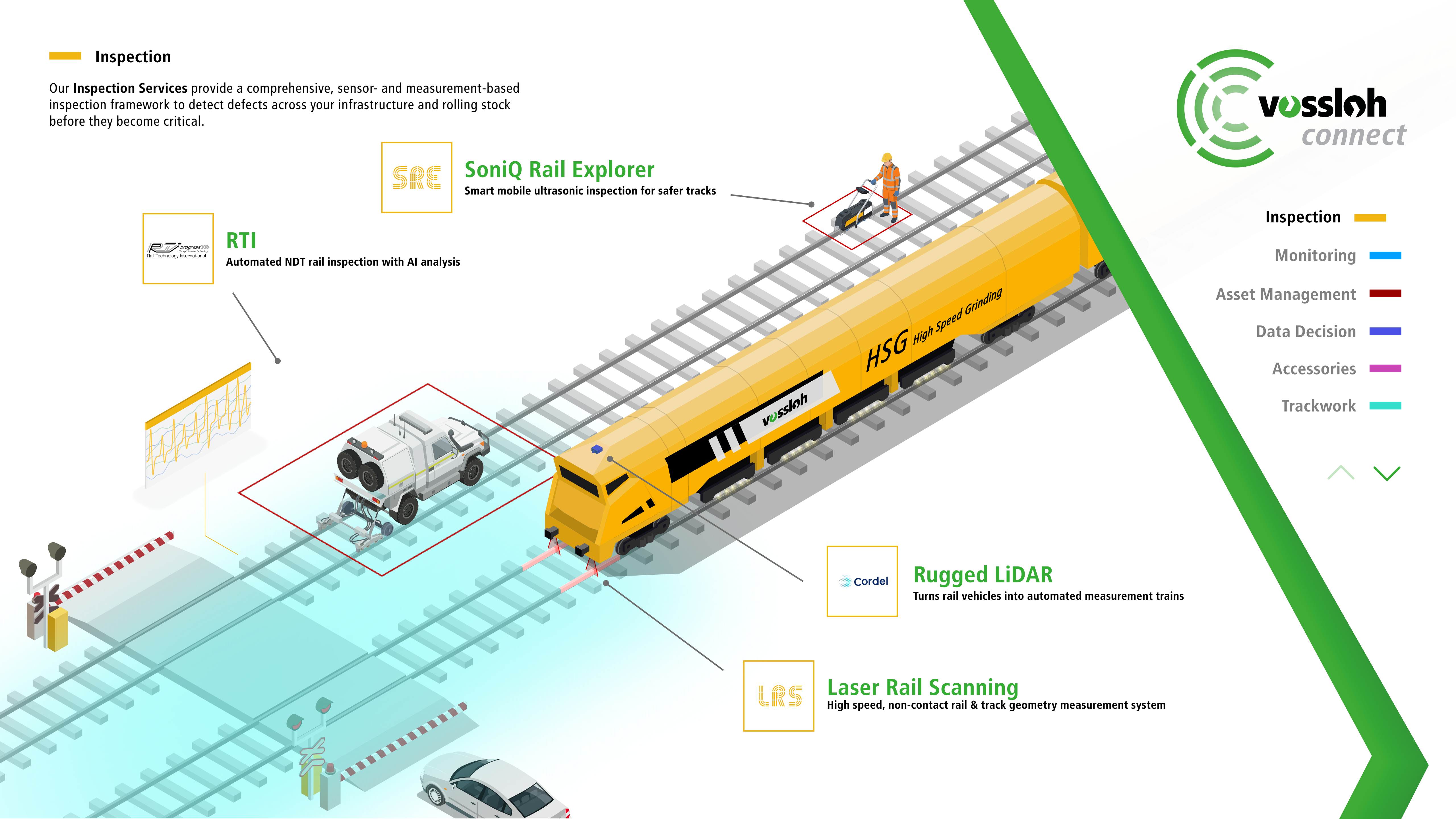
RTI
Automated NDT rail inspection with AI analysis



Rugged LiDAR
Turns rail vehicles into automated measurement trains

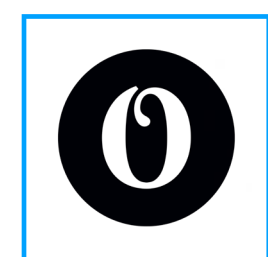


Laser Rail Scanning
High speed, non-contact rail & track geometry measurement system



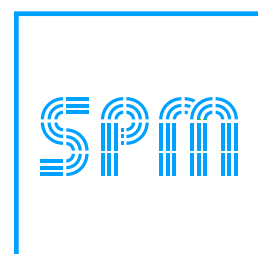
Monitoring

Our **Monitoring Solutions** provide a comprehensive, sensor- and camera-based monitoring framework to keep every critical element of the rail network under constant surveillance.



Opera

Cyber-physical exposure management for rail networks



Smart Point Machine

Adaptive monitoring and diagnostics catalyst



Smart Turnout

Vibration-based turnout condition monitoring



Athena ARCD

Monitoring of broken rails and train presence



Easy Level Crossing

Intelligent Rail Crossing Monitoring & Safety System



Level Crossing Vision

Camera-based level crossing monitoring



S-scan

Near-Surface images for subsoil characterization



Pulsar

AI-powered train identification and condition monitoring



Strainlabs System

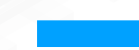
Condition monitoring of bolted joints



Inspection



Monitoring



Asset Management



Data Decision



Accessories

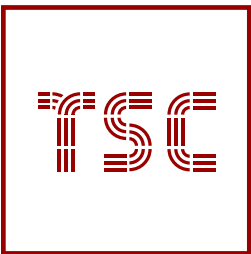


Trackwork

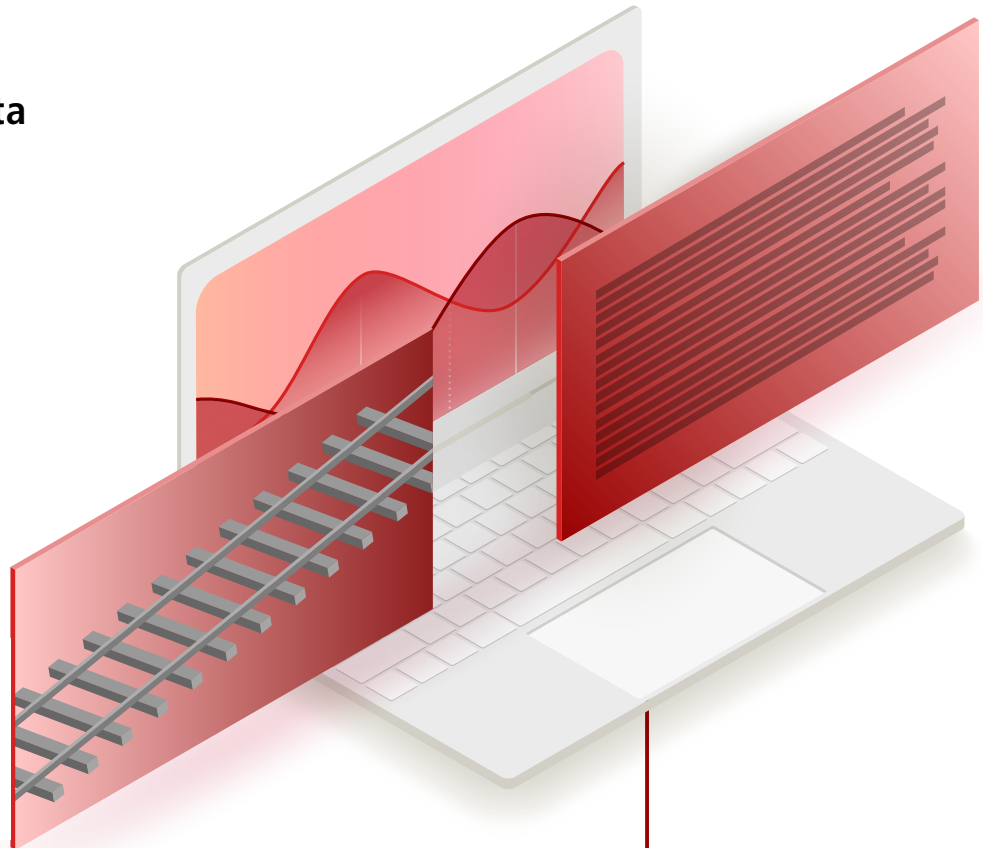


Asset Management

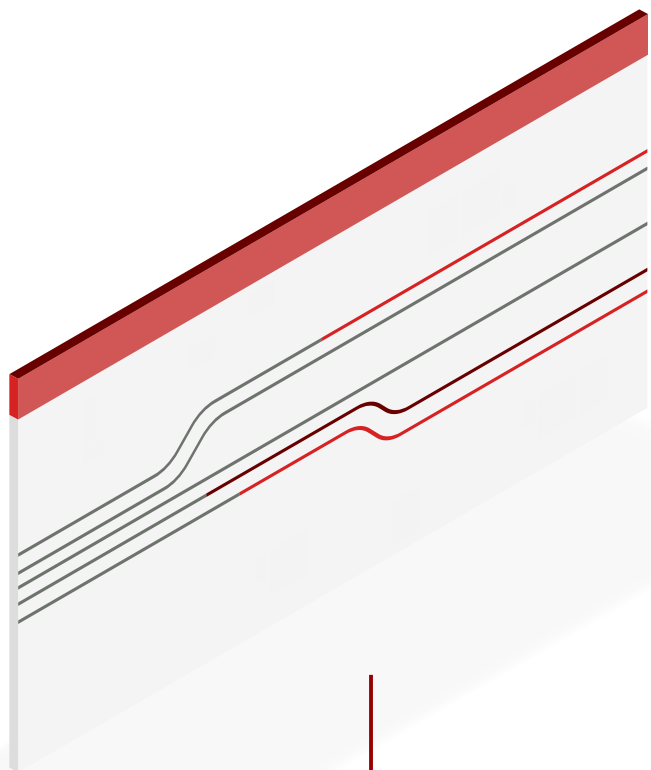
Our **Asset Management Solutions** provide a precise, data-driven overview of your entire rail infrastructure to keep every asset's condition and maintenance needs under full control.



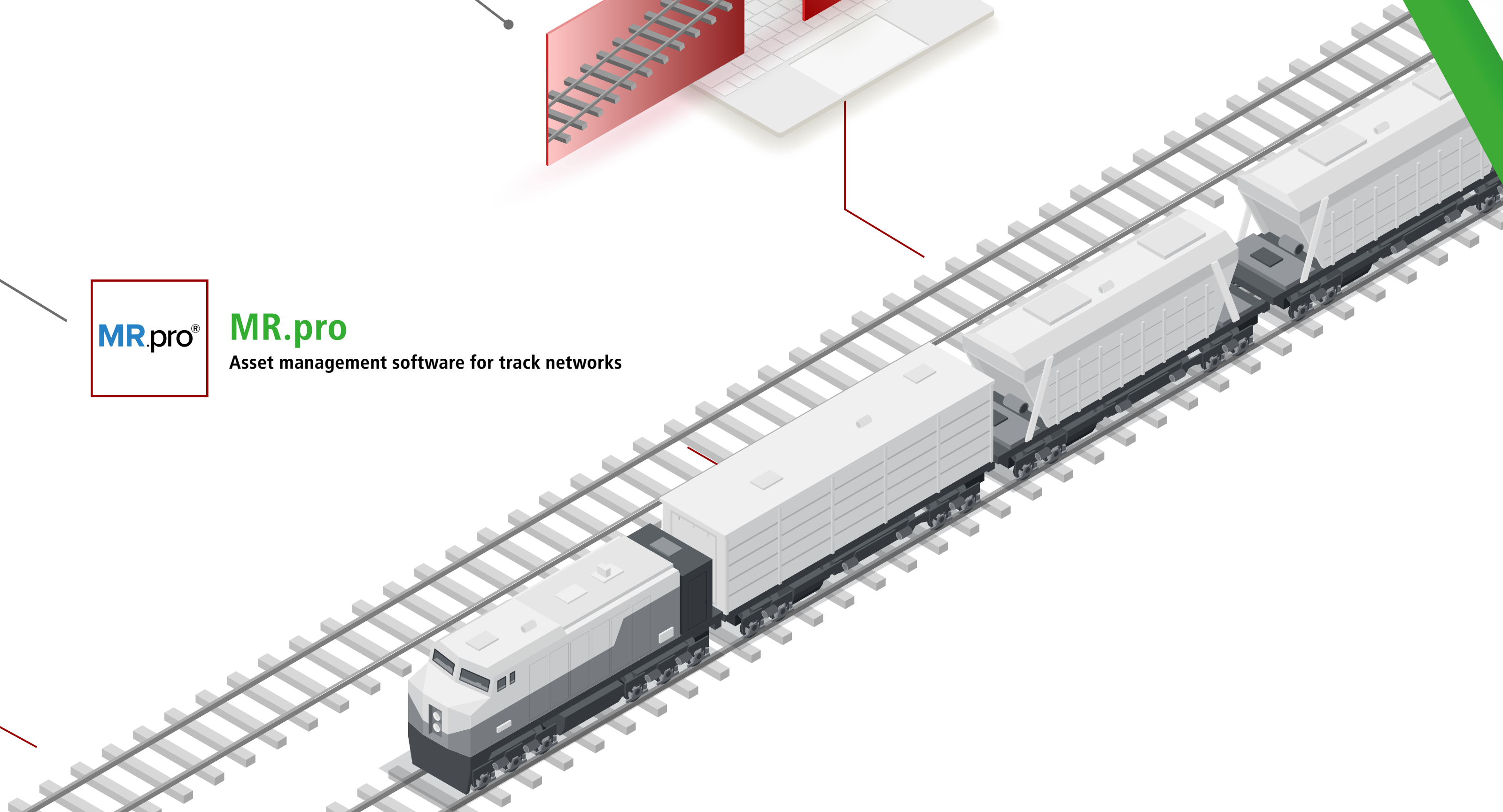
Trackscape
Central dashboard bundling all infrastructure data



MR.pro
Asset management software for track networks



- Inspection 
- Monitoring 
- Asset Management 
- Data Decision 
- Accessories 
- Trackwork 



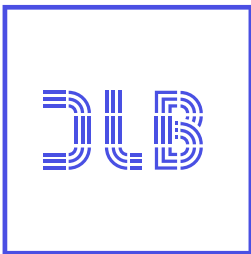
■ Data Decision

Our **data decision** solutions turn infrastructure and rolling stock data into clear, actionable guidance, helping operators extend infrastructure lifespan, cut lifecycle costs, and improve safety through smarter, data-driven decisions.



TrackStability

Risk assessment for track misalignment and buckling, with data-driven recommendations

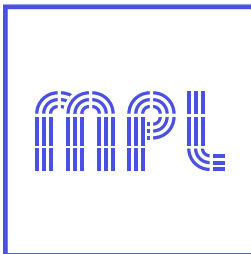


Data Lab

Advanced rail infrastructure data analysis software

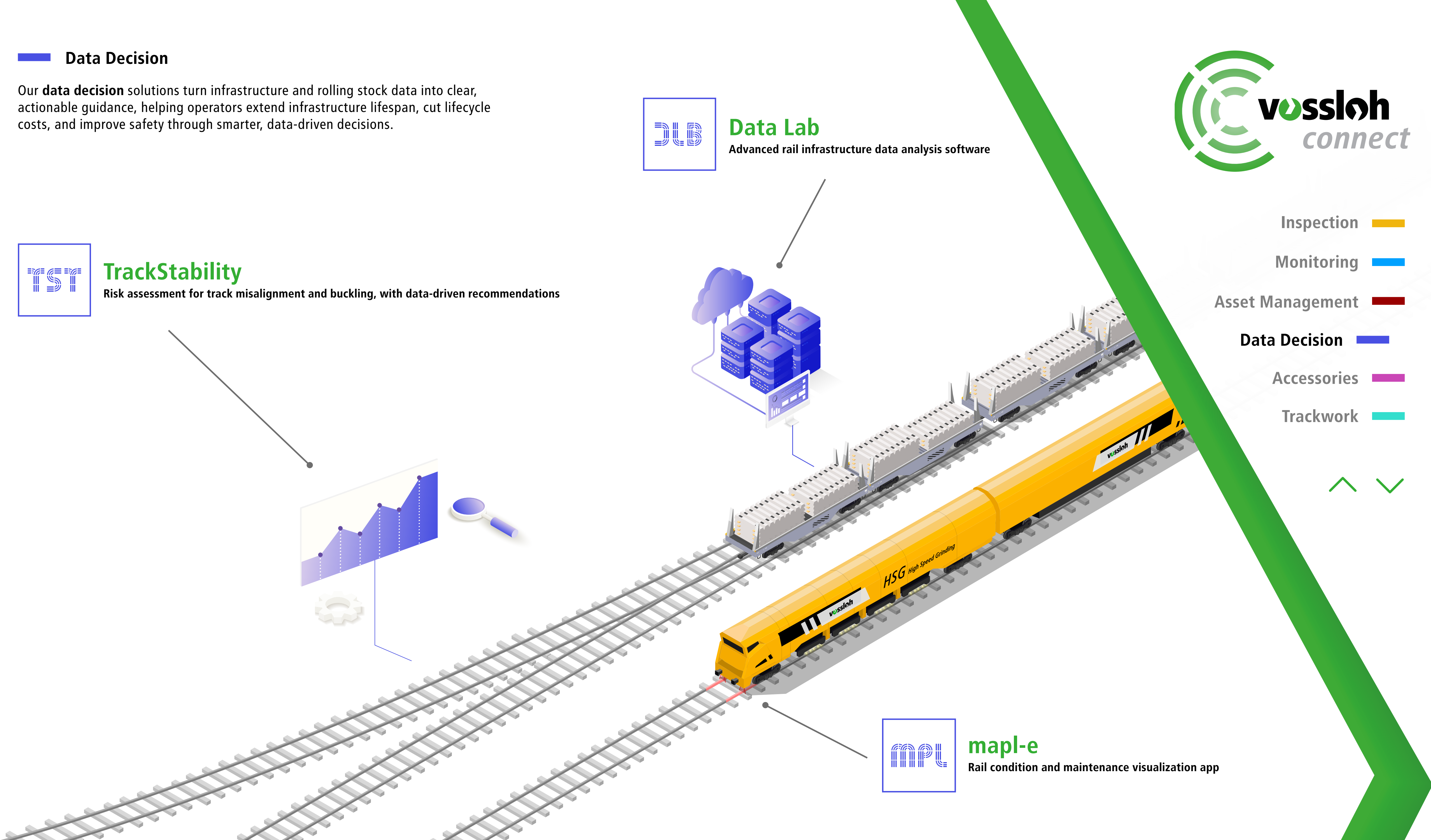


- Inspection 
- Monitoring 
- Asset Management 
- Data Decision** 
- Accessories 
- Trackwork 



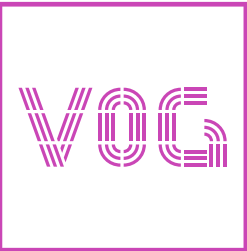
mapl-e

Rail condition and maintenance visualization app

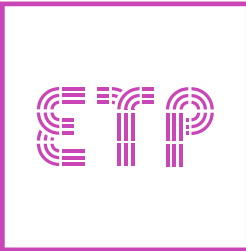


Accessories

Our **Accessories** provide a comprehensive, sensor- and connectivity-based toolkit to keep every critical component of your railway reliably connected and continuously monitored.



Vossloh Open Gateway
Smart gateway linking legacy railway equipment to digital monitoring networks



EATEMP
Smart sensor for real-time rail temperature monitoring



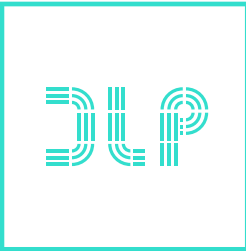
EAFLEX
Intelligent sensor tracking rail movement to enable predictive maintenance

- Inspection 
- Monitoring 
- Asset Management 
- Data Decision 
- Accessories 
- Trackwork 

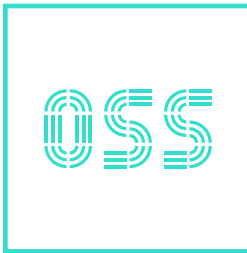


Trackwork

Our **Trackwork Solutions** provide a comprehensive, tool- and technology-based framework to support every phase of track work, from meticulous planning to safe, efficient execution.



Digital Logistics Planner
Gamification for higher track availability



OSI-Shunt
Plug-and-play track occupancy simulation and controlled shunting



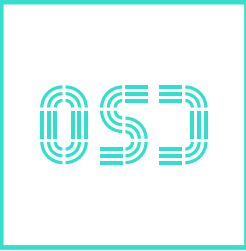
EAPark
Real-time track occupancy monitoring for smarter lane and garage management



OSI-Switch Position
Plug-and-play switch monitoring with LED malfunction alerts



EATracker
Real-time equipment tracking to prevent loss on worksites



OSI-Detonator
Automated train warning system for trackside worksites

- Inspection
- Monitoring
- Asset Management
- Data Decision
- Accessories
- Trackwork





SoniQ Rail Explorer

Smart mobile ultrasonic inspection for safer tracks

Problem description

Undetected defects inside the rail

Hidden defects inside the rail often go undetected until they cause failures, driving up maintenance costs and shortening track life.

Solution description

The future of mobile ultrasonic inspection

The SoniQ Rail Explorer, a joint development of Vossloh and the Fraunhofer IKTS, represents the future of mobile ultrasonic inspection. This smart solution ensures precise defect detection, keeping tracks safe and reliable. With advanced technology and data-driven insights, rail maintenance becomes even more time- and cost-efficient.

Depending on individual track maintenance needs, customers can choose between purchasing a SoniQ Rail Explorer, including training and software, or having their rails inspected as a service.

How it works

Main Features

- › Ultrasonic rail inspection with nine probes at an inspection speed of 3 km/h
- › Measuring of the rail's longitudinal and transverse profile
- › Localization of operations-related irregularities in the rail's interior
- › Detection of reflectors from volumetric defects on both the gauge corner side and the field side
- › The nine probes in the ultrasonic test wheel cover nearly 100% of the rail head, reliably detecting reflectors from volumetric defects 5 mm below the rail surface on both the gauge corner and field sides
- › Linked to an encoder (incremental distance marker) for positioning accurate to the millimeter
- › Direct data access via tablet, enabling immediate integration into a digitalized process chain
- › A guide system ensures the probes sound the rail from the best possible position (the waves from the vertical probe must go through the rail's web)





SoniQ Rail Explorer

Smart mobile ultrasonic inspection for safer tracks



Additional Features

- › Ergonomic design with balanced weight distribution and the center of mass located in the middle makes the device very easy to carry.
- › No interference with track signaling and switching equipment. Attestation from DB Systemtechnik.
- › Optimized coolant use, regulated valve operation and distribution by brushes, and a battery containing individually replaceable conventional lithium-ion cells.
- › Hardware and software from a single provider. Designed and manufactured in Germany.
- › Customizable user interface, modular system, automatic rail height detection, gain adjustment without changing the DAC curve's characteristics, and integration into all common asset management systems.
- › Optional storage of raw data, a volume scan of all raw data (signals displayed depend on the gate settings/slider), and real-time collection and analysis of track data.



Optional components

Optional components help optimize inspections, reduce downtime and extend rail life. A camera captures location-referenced photos of the rail surface alongside the ultrasonic data, documenting the rail's condition and maintenance history. Artificial intelligence pre-classifies reflectors of serious defects using learning algorithms and displays the results to the inspector. Augmented reality overlays detected indicators as a perspective-accurate 3D image, simplifying interpretation and classification of findings.



Sophisticated design and easy to use

Design objectives: lightweight, easy to use and extremely sturdy for trackside use.

Dimensions (operating mode)	870 x 300 x 930 mm (L/W/H)
Dimensions (transport)	1,100 x 300 x 580 mm (L/W/H), fits easily in the back of a car
Weight	Under 20 kg (carbon-fiber reinforced plastic)
Ergonomics	Slimline body design with evenly distributed weight for easy carrying
Handedness	Suitable for both left- and right-handed operators
Accessories	Optional shoulder strap available
Upgrade option	Can be upgraded to inspect the left and right rails simultaneously)

Collecting and analyzing track data in real time

Smart data solutions maximize the efficiency of track maintenance. The continuous rail testing technology captures, analyzes and transfers real-time insights, ensuring precision in every inspection. From ultrasonic rail testing to AI-driven defect detection, the system transforms raw data into smarter maintenance decisions, keeping tracks safer and more reliable.

Data logging	Capture of all raw data or only data above a threshold, storing up to 30 km of rail data
Data analysis	Real-time analysis with various insights from the collected values
Data transfer	Files can be sent via LTE, Wi-Fi, USB or SD card for seamless access



Automated NDT rail inspection with AI analysis



Subjective, inconsistent rail flaw detection

RTI equips hi-rail, rail-bound or push-trolley platforms with automated NDT systems that can be fitted to a wide range of vehicle types, so a single vehicle and operator can capture ultrasonic and magnetic surface data directly from the network. AI-based analysis removes subjectivity from the decision-making process, allowing rail surfaces and internal flaws to be analysed faster and more efficiently with greater consistency and repeatability. Results are then organized in SmartMaps, a visual, map-based infrastructure database built to support track maintenance decisions

Automated NDT inspection from capture to decision

RTI equips hi-rail, rail-bound or push-trolley platforms with automated NDT systems that can be fitted to a wide range of vehicle types, so a single vehicle and operator can capture ultrasonic and magnetic surface data directly from the network. AI-based analysis removes subjectivity from the decision-making process, allowing rail surfaces and internal flaws to be analysed faster and more efficiently with greater consistency and repeatability. Results are then organized in SmartMaps, a visual, map-based infrastructure database built to support track maintenance decisions



Main Features

-

- One machine, one operator model, positioned as a more efficient alternative to larger crews
- Compact hardware suited to remote and harsh operating environments
- Detection of rolling contact fatigue, surface breaking transverse defects, defective welds, cracks in switches and frogs, welds, rail ends, insulated rail joints, squats, engine burns, hunting, track pumping and low-level corrugation via SurfaceMap

- › Faster, more consistent internal flaw and surface defect detection
- › Reduced dependence on subjective manual assessment
- › Centralized, auditable defect history via SmartMaps
- › Better-targeted rail grinding, replacement and maintenance planning





Rugged LiDAR

Turns rail vehicles into automated measurement trains

Problem description

Fragmented and resource-intensive rail inspections

Traditional infrastructure inspections often rely on manual field assessments, isolated surveys and disconnected datasets. This can lead to subjective results, long processing times and limited visibility across the network. Engineering and maintenance teams need a faster, more consistent way to identify changes, exceptions and potential risks.

Solution description

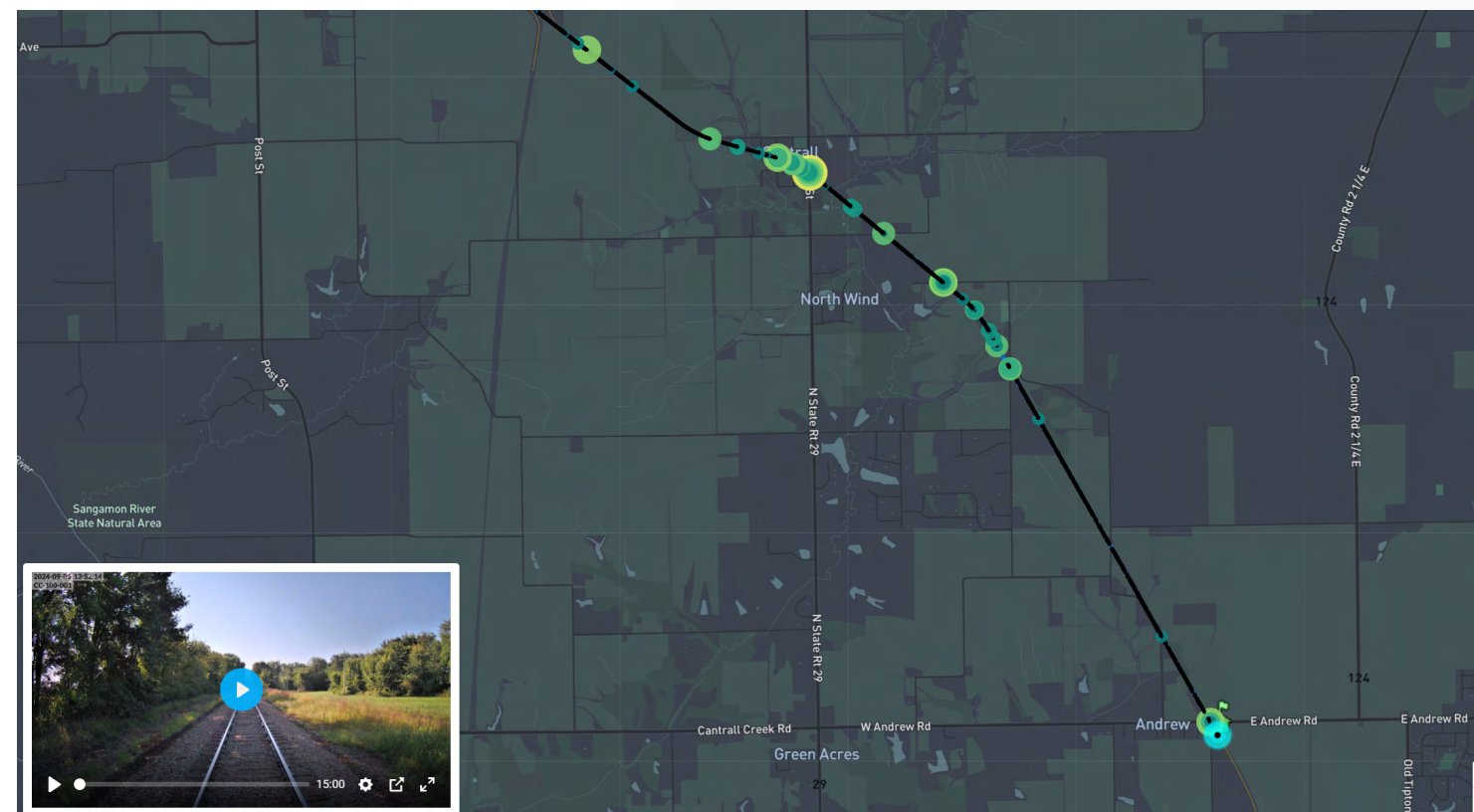
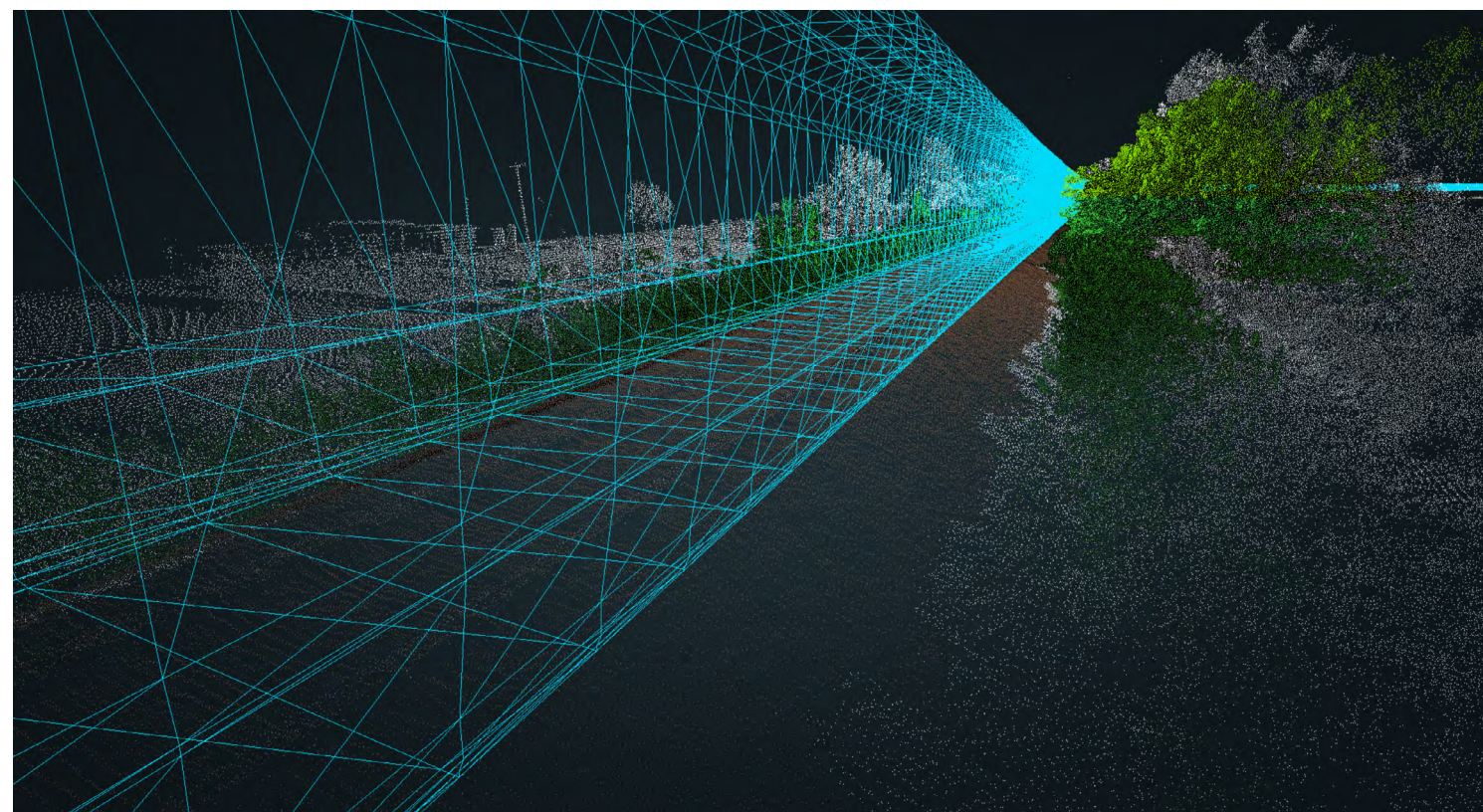
Automated inspection from capture to decision

Cordel transforms rail vehicles into infrastructure measurement trains. LiDAR, video and sensor data are captured automatically, processed by purpose-built AI models and managed in a single cloud platform. This provides a consistent source of truth for infrastructure conditions and enables teams to turn network-scale data into actionable insights.

Main Features

AI-powered data capture and analysis

- › Unattended data capture: Movement-triggered recording, automated upload and coverage management
- › Automated analysis: AI-powered evaluation of LiDAR, video and sensor data
- › Network-scale insights: Consistent and repeatable results across the rail network
- › Automated exception reporting: Faster identification and prioritization of relevant findings
- › Single cloud platform: Centralized storage, retrieval, indexing and access
- › Quality-assured outputs: Built-in QA, audit traceability and version control





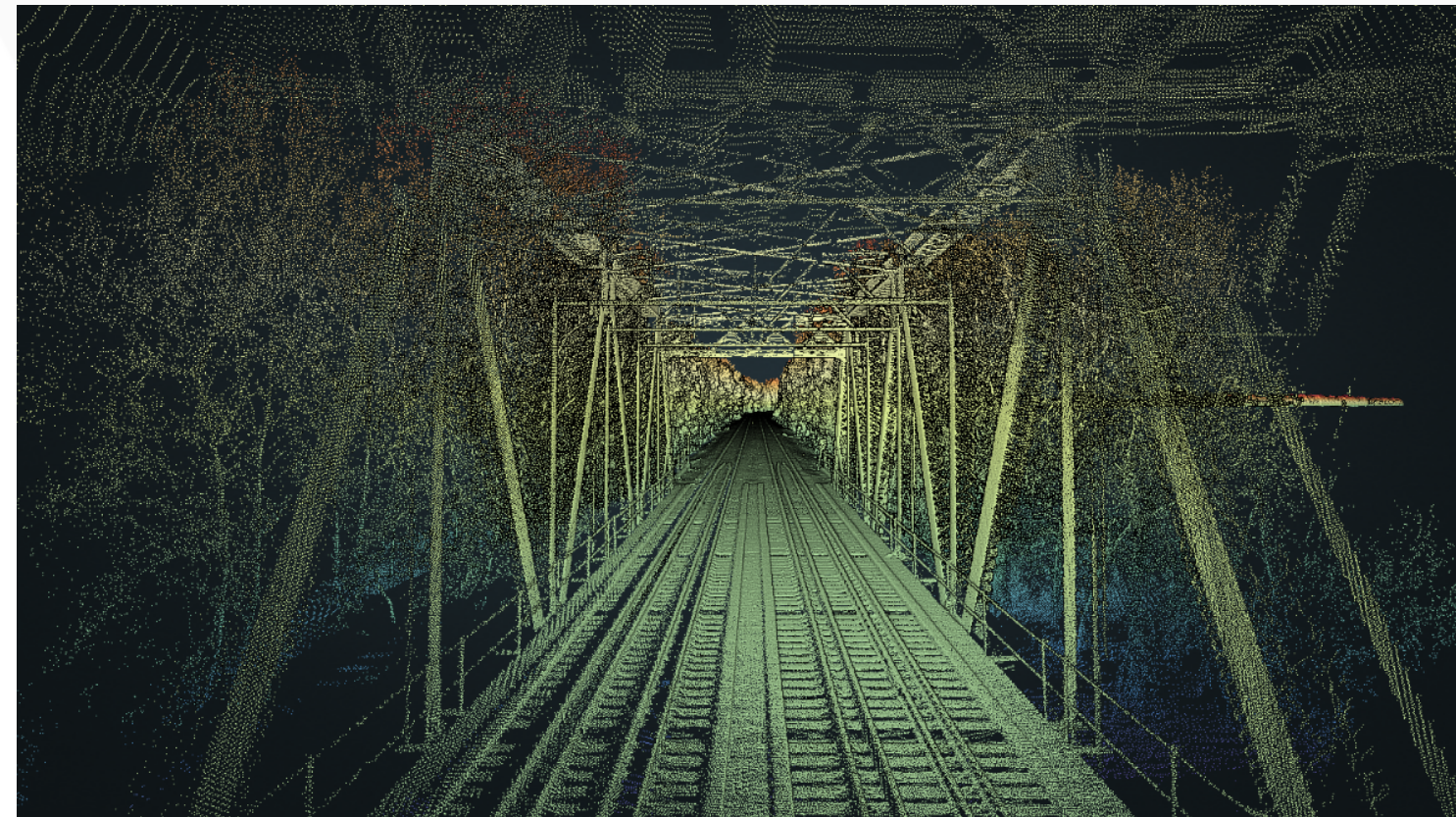
Rugged LiDAR

Turns rail vehicles into automated measurement trains



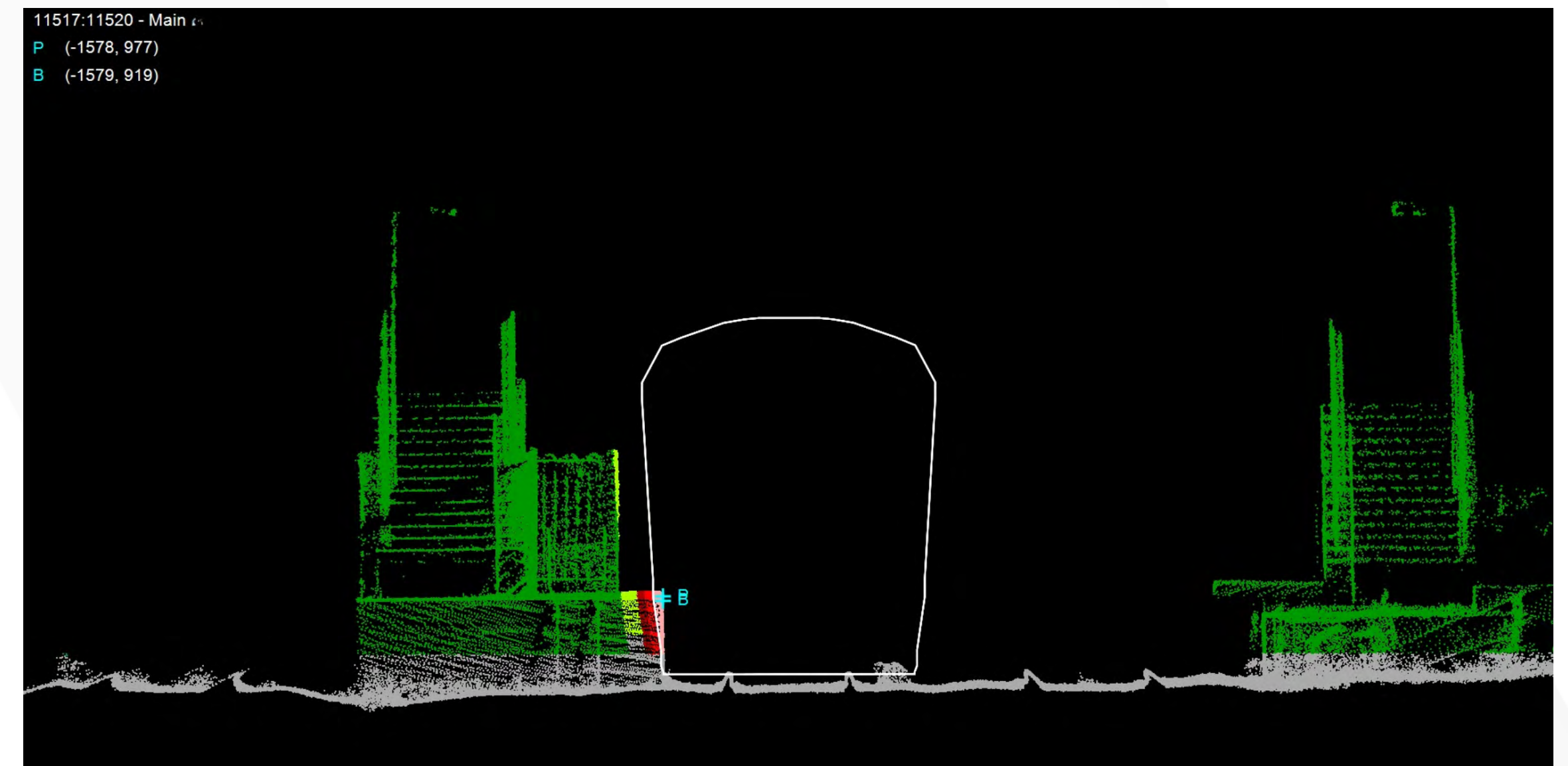
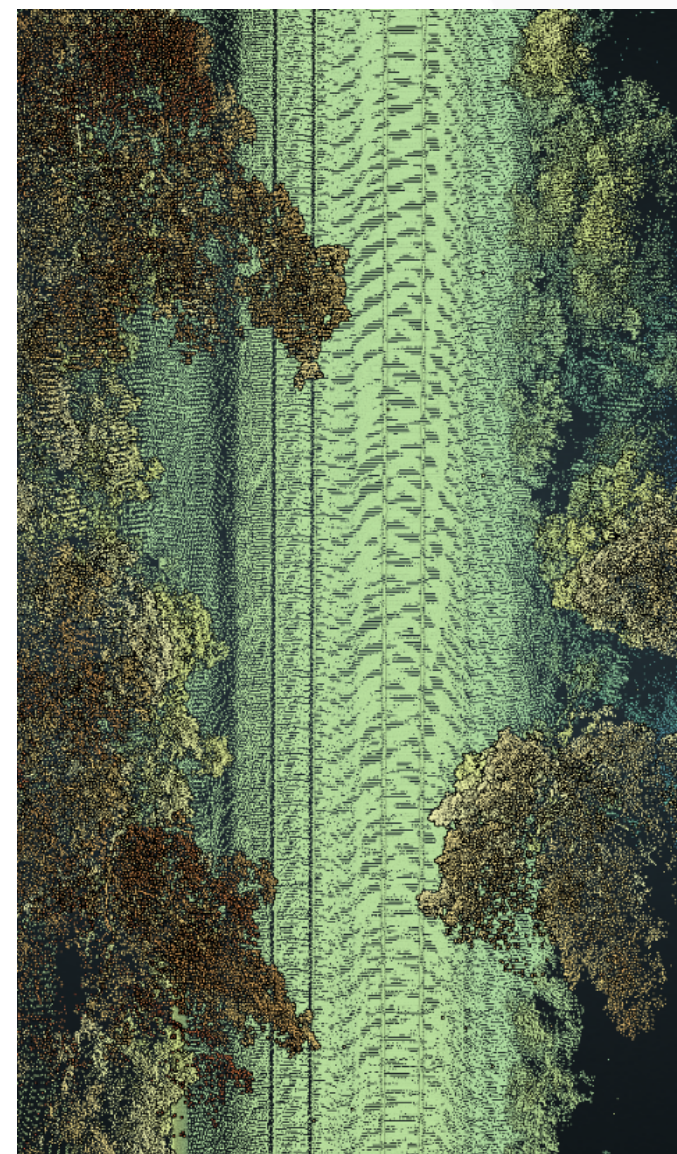
Additional Features

- › Self-calibrating sensors and remote diagnostics
- › Low-maintenance hardware designed for harsh rail environments
- › Analysis of track centerlines, clearance and gauging, ballast profiles, vegetation encroachment, OLE height and stagger
- › Asset detection and change monitoring
- › Results delivered in days rather than months
- › Customer-specific AI models that improve with every capture
- › Self-service, on-demand assessments
- › API access for integration with existing enterprise systems
- › Reduced data-processing bottlenecks without additional headcount



Use Case

- › Track Position and Track Geometry
- › Structure gauge and Infrastructure profiles
- › Ballast Assessment
- › OLE – Overhead Line Equipment
- › Vegetation Management
- › Level Crossings





Easy Level Crossing

Intelligent Rail Crossing Monitoring & Safety System

Problem description

Monitoring critical level crossing equipment in real time

Level crossing equipment needs continuous supervision, since undetected failures or malfunctions in signals and barriers create serious safety risks.

Solution description

Intelligent, sensor-based supervision of level crossings

ELX provides intelligent supervision of level crossings, monitoring the status of critical equipment in real time. By sending accurate alerts, the system enhances safety and helps modernize and increase the reliability of sensitive infrastructure.



How it works

Main Features

- › Train presence detection (IP65 & IK08, LoRaWAN, battery powered, low energy)
- › Light signal detection (LoRaWAN, battery powered, low energy, -40°C to 70°C)
- › Sound signal detection (LoRaWAN, battery powered, low energy, -40°C to 70°C)

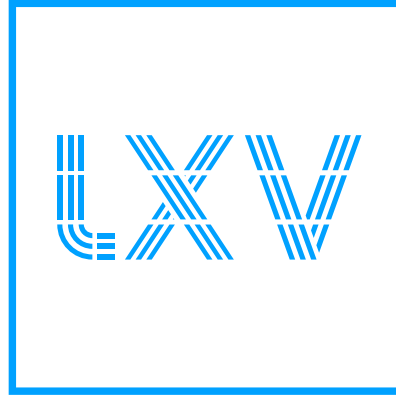
Additional Features

- › Barrier position / broken barrier detection (LoRaWAN, battery powered, low energy, -40°C to 70°C)
- › Maintenance support through failure detection
- › Optimized traffic flow by identifying bottlenecks and adjusting traffic light and barrier timings
- › Support for incident investigation through recorded data
- › Centralized monitoring of multiple level crossings via the Cockpit dashboard, reducing costs



Specification	
System composition	- Barrier position monitoring - Sound Barrier - Brightness monitoring - Train passage monitoring - Data concentrator
Number of sensors	5
Ergonomics	Installation time per unit: 3 minutes, non-intrusive
Battery life	Lithium battery – 3 years
Communication	Private LoRaWAN connection to the concentrator
Technical features	Display on the gateway via a local connection; database storage
Data access	Real-time information accessible via a web platform





Level Crossing Vision

Camera-based level crossing monitoring

Problem description

Accidents at level crossings are rare but extremely dangerous - they account for only 1.2% of road fatalities, but 29% of all rail fatalities. Despite automatic protection systems, risks remain. Our solution combines state-of-the-art technologies to create a comprehensive safety and monitoring system that both protects road traffic and optimises rail operations.

Solution description

LXV to enhance safety and operational efficiency at level crossings

LXV is a surveillance-based solution designed to enhance safety and efficiency at level crossings. Key benefits include:

1. **Monitoring Traffic** – Tracks vehicle and pedestrian movement to identify hazards and congestion.
2. **Accident Documentation** – Provides clear footage for investigations in case of incidents.
3. **Real-Time Alerts** – Detects unusual behavior and triggers immediate warnings.
4. **Enhanced Safety** – Deters risky actions by increasing awareness of surveillance.
5. **Traffic Management** – Helps optimize traffic flow and signal timing.
6. **Remote Monitoring** – Allows operators to oversee crossings from a control center.
7. **Proactive Safety** – Uses technology to prevent accidents before they happen.

LXV is a forward-thinking solution that improves both railway security and operational efficiency.

How it works

Main Features

- **Failure Detection** – Identifies malfunctions in lights, barriers, and sound signals for maintenance planning.
- **Object & Traffic Monitoring** – Detects, identifies, and timestamps pedestrians, vehicles, and objects at the crossing.
- **Local Warning System** – Analyzes situations, detects risks, and triggers local alerts to prevent accidents.
- **Incident Recording** – Stores time-stamped event data (train passage & safety system activation) for 30 days for investigations.
- **Sensor Network Management** – Monitors visibility and connectivity of all deployed sensors.

This system enhances safety, ensures fast incident response, and optimizes railway operations.

Hardware

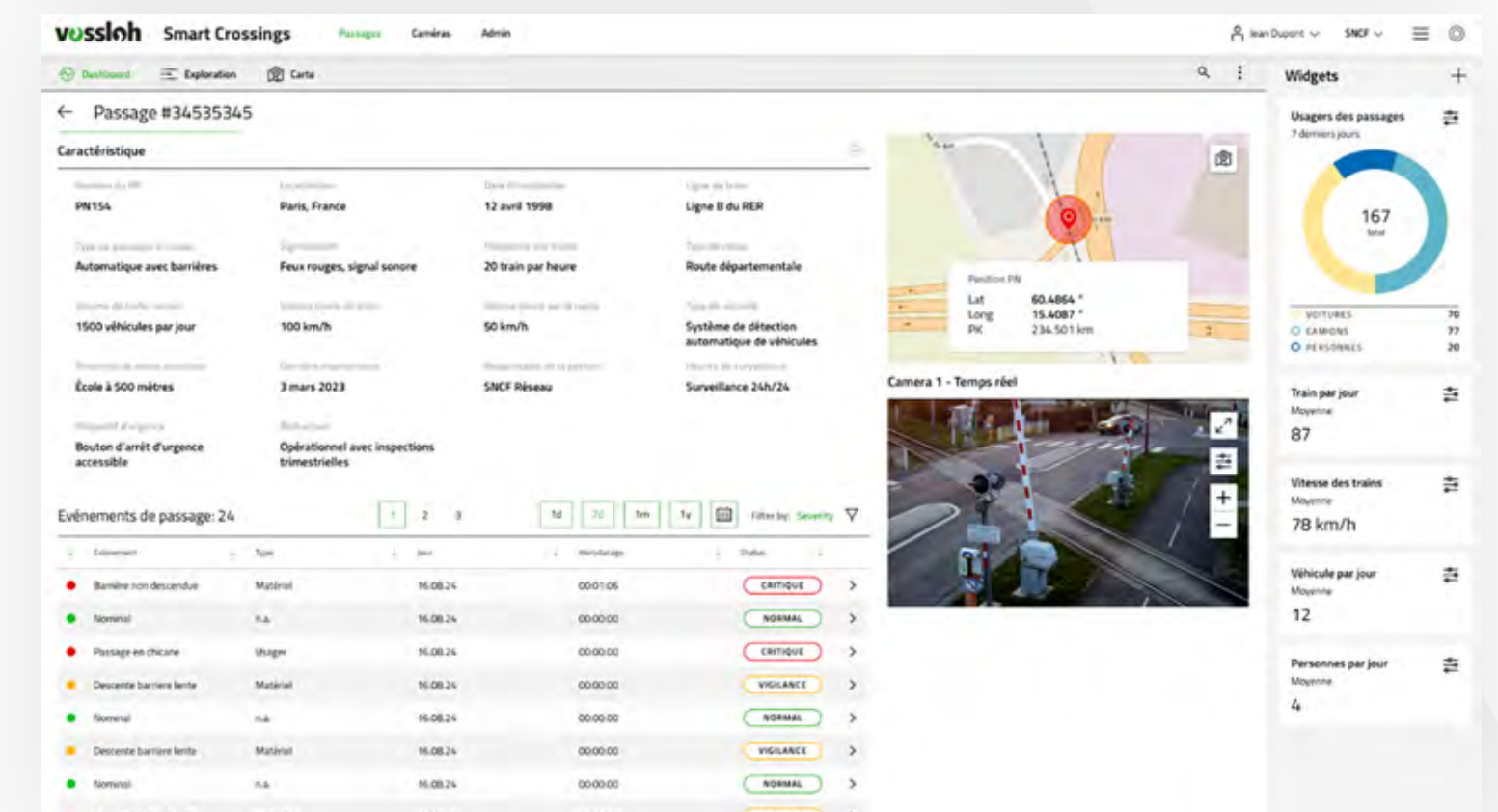
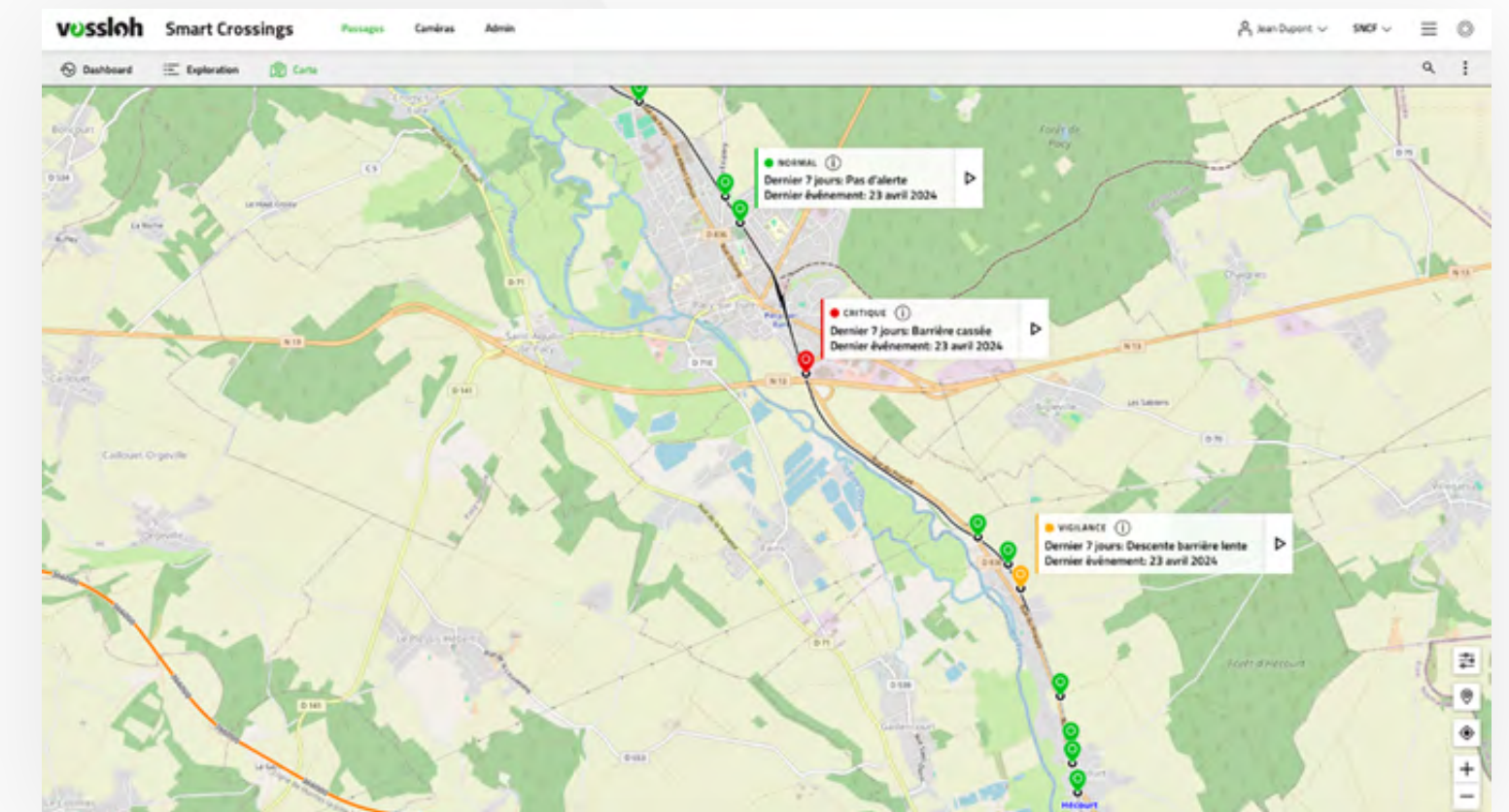
Our solution is composed of 1 up to 2 IP cameras (CCTV cameras) and microphones per level crossing, recording video and audio streams.

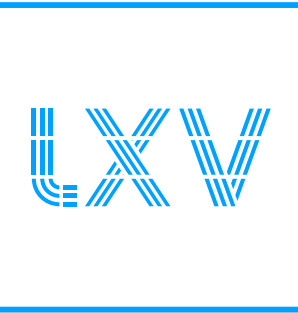
A GPU-based data acquisition system is used for local processing and scenario detection.

Streaming data and recorded scenarios / events of interest are uploaded via 5G/LTE, processed and stored in the cloud.

A web portal allows users to access, control and monitor the level crossing.

Cameras can be mounted at existing customer infrastructure under specific conditions or - optional - mounting structures (CCTC / camera towers) can be provided and installed for each camera.





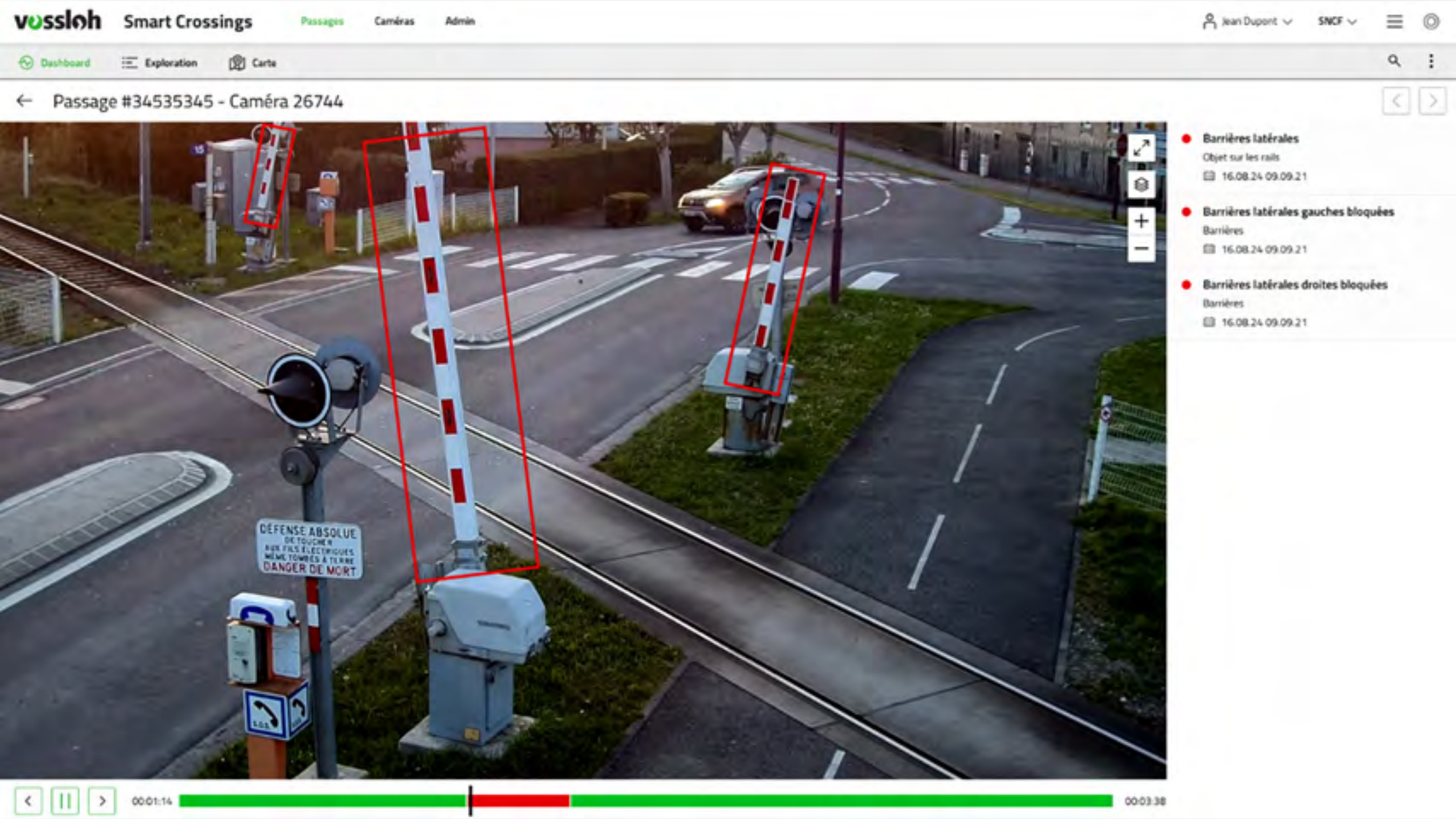
Level Crossing Vision

Camera-based level crossing monitoring



Additional Features

- › 24/7 Monitoring: vision analysis
- › Non-intrusive acquisition system
- › Wireless communication
- › Easy to install
- › Event recorder
- › Object detection and identification
- › Object tracking and counting for statistics
- › Monitor barrier / lights functionality and state
- › Timing analysis (barrier open / close time, time from closing to train, object last within barriers)
- › Detection of passage with lights on / barriers moving or closed



Power	110-230 V / 50/60 Hz AC
Cameras per level crossing	up to 2
Cameras	RTSP streaming, PoE
Dimensions per tower	2x14.4v/17Ah battery pack (serviceable)
Weight per tower	2.5 years (depends on the data transmission volume)
IP Rating	IP 67
Connectivity	LTE or 5G



Opera

Cyber-physical exposure management for rail networks

Problem description

Rail operators lack consequence, not data

Signalling, traction power, rolling stock and station systems are now connected to each other and to corporate IT. Asset inventories, vulnerability scans and OT monitoring already produce more findings than any team can act on, and most arrive as a severity score with no operational meaning.

Leadership needs different answers: which exposure could stop service tomorrow, which one touches a safety function, and what to fix first inside a maintenance window. Since patching is often impossible on certified rail assets, ordering the backlog by severity alone leaves teams with no clear argument for action.

Solution description

Opera translates cyber exposure into operational consequence

Opera is an agentic security operations platform for cyber-physical environments. It deploys fully passively from a SPAN or TAP port, with no agents and no active scanning, and reads the rail network down to the embedded control and serial layer where signalling and point machine logic actually lives, below where network-level tools stop. From that traffic, Opera builds an operational graph of identities, network assets, controllers, control loops and the services they carry. It then models attack paths deterministically against the real process logic, so each finding states which operational function is exposed and what would degrade if it were exploited. Every finding carries a complete evidence chain, a risk score and a recommended compensating control that respects certification and downtime constraints. Findings and briefs are delivered into the tools the operator already uses, and the same evidence supports CLC/TS 50701 and IEC 62443 programmes and reporting under NIS2.

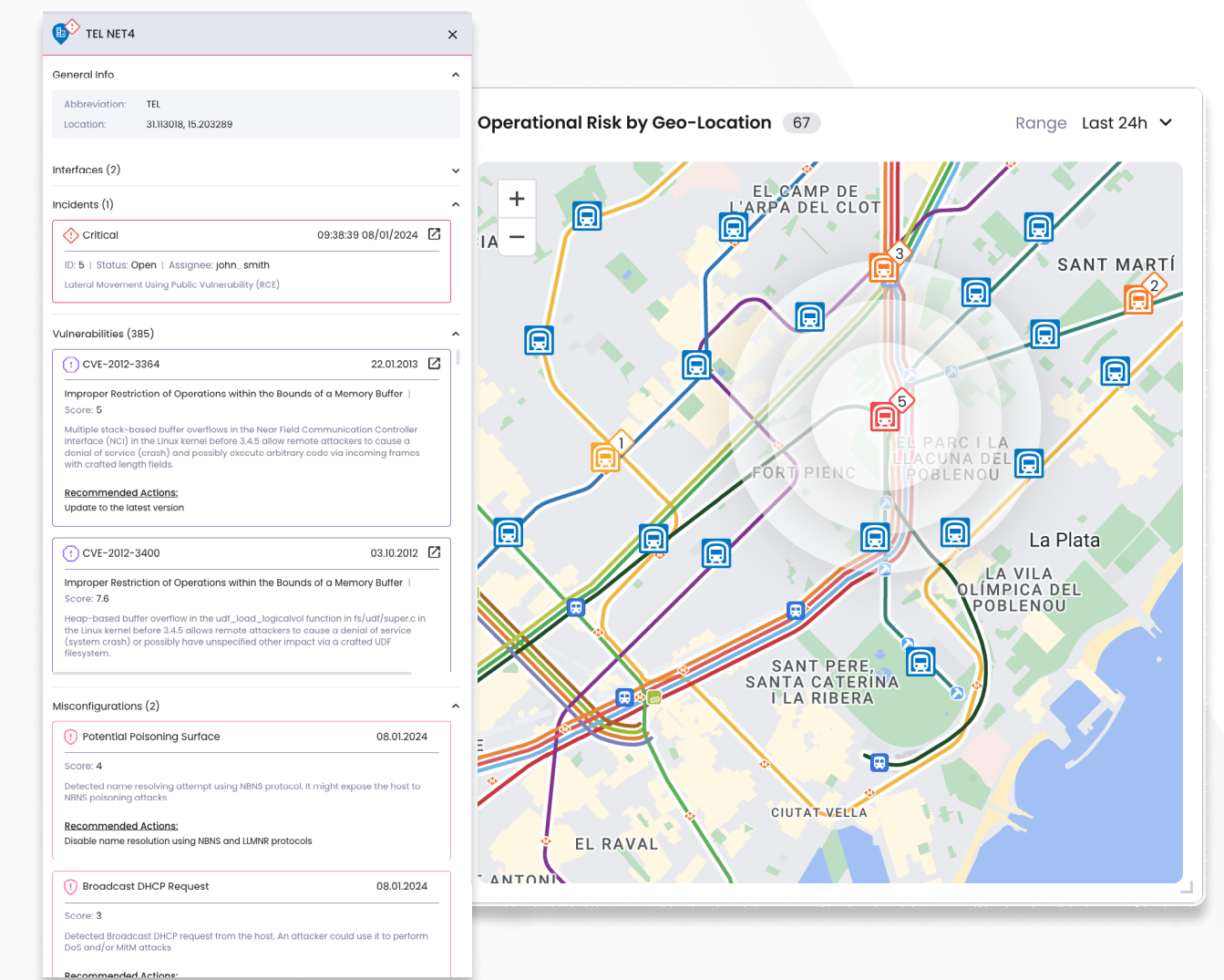
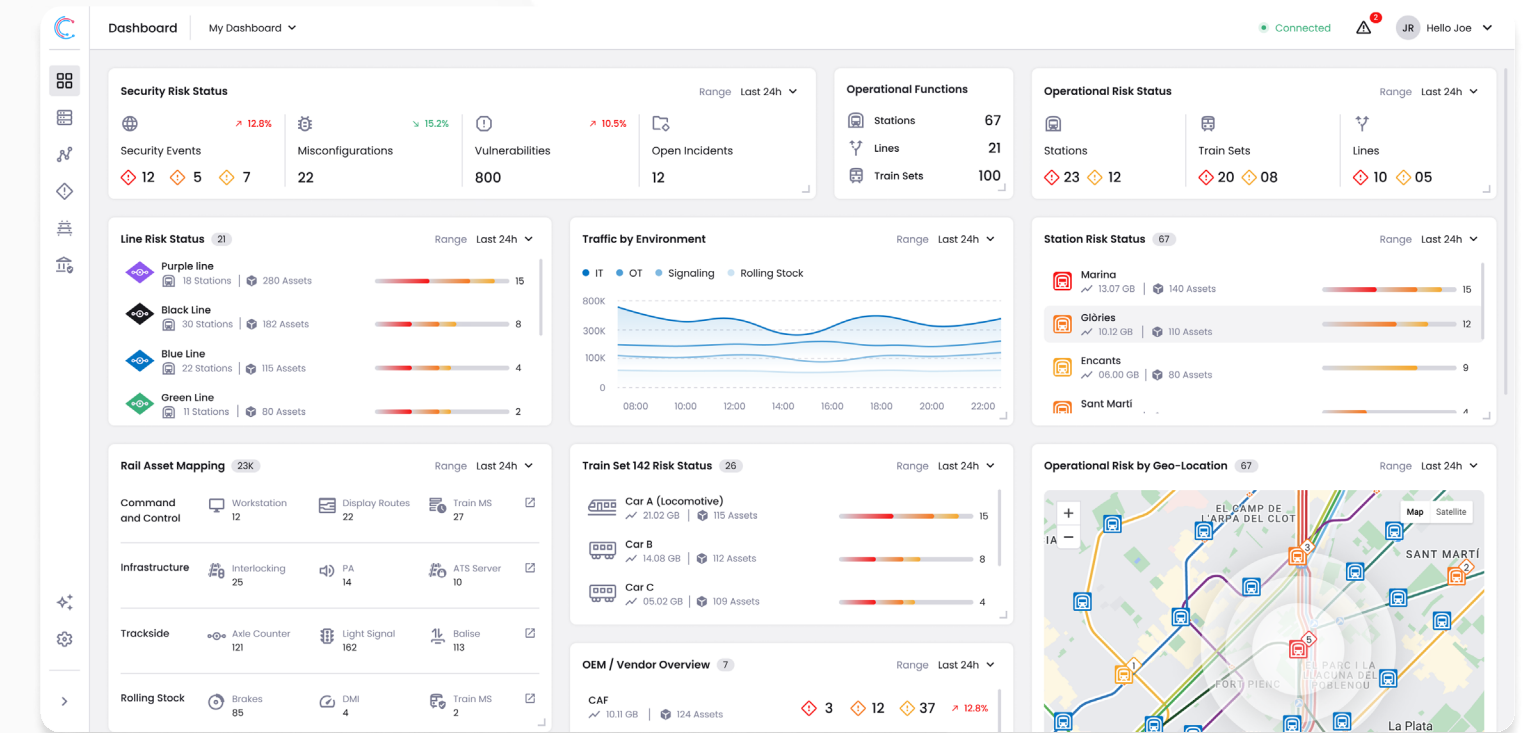
How it works

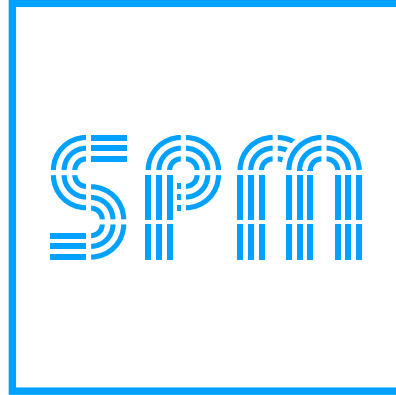
Main Features

- › Fully passive deployment: no agents, no active scanning
- › Inspection down to the embedded control and serial layer
- › Builds an operational graph across rolling stock, signalling and stations
- › Deterministic attack-path modelling on real process logic
- › Prioritisation by operational consequence, not just severity score
- › Every finding, fully documented with a risk score
- › Non-disruptive, compensating controls
- › Board-, operator- and regulator-ready risk briefs

Hardware / Deployment

There is no trackside hardware to install and no change to existing infrastructure. Opera collects mirrored traffic at the points the operator already aggregates it (depots, stations, signalling rooms and control centres) and runs on-premise or in a virtualised environment. Nothing touches the control plane.





Smart Point Machine

Adaptive monitoring and diagnostics catalyst

Problem description

Adaptive monitoring and diagnostics catalyst

Point machine failures lead to costly downtime and unplanned repairs.

Solution description

Enabling failure detection

Smart Point Machine solution is a Condition Monitoring solution that continuously monitors the condition of point machines.

High-performance sensors collect real-time data of various parameters such as electrical. This data is analyzed to provide indicators.

The solution can be programmed and configured remotely, allowing for easy and secure adjustments and updates.

Point machine monitoring solutions can be integrated with other railway systems, such as SCADA, signaling systems or SIEM, to streamline raw data or events.

Instant alarms are generated when specific conditions occur on the point machine parameters, or on devices that compose the acquisition system.

Smart point machine acquisition architectures are scalable and can be adapted to different point machine models and types, making them versatile for various railway networks.

Prepares for condition-based maintenance, which helps prevent breakdowns, reduce service interruptions and the number of necessary inspections.

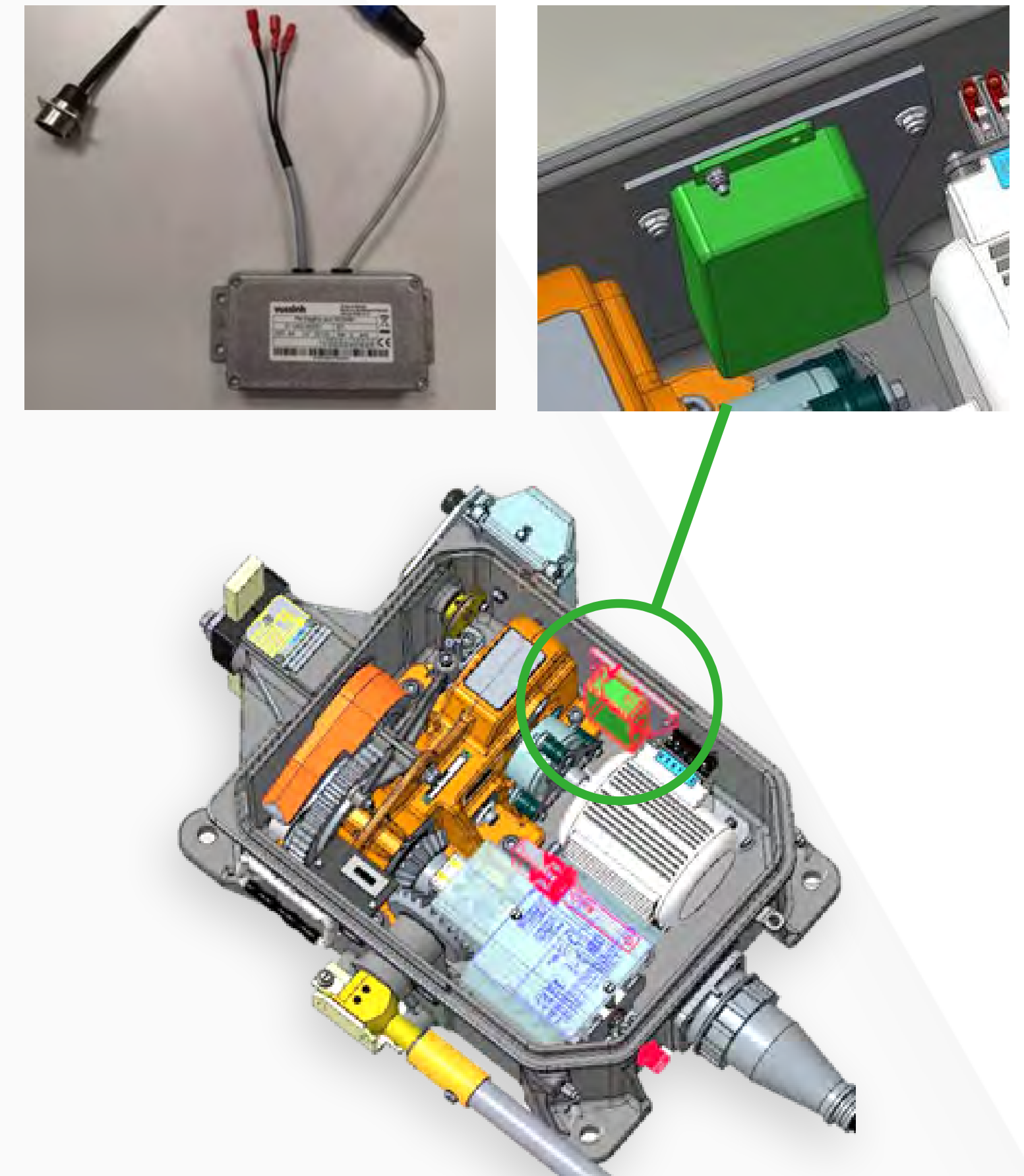
How it works

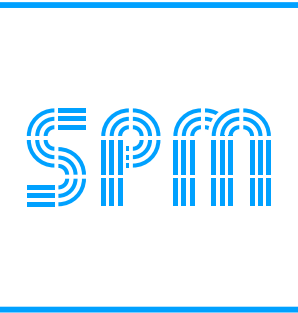
Main Features

- › For each phase of the switch operation indicators are calculated by off-loaded post-processing from the acquired data.
- › Alarm settings on the calculated indicators on each point machine.
- › Field data acquisition equipment (current, voltage, active power), integrated into the railway system, with no impact on safety, meeting its constraints, and proven.
- › Highly flexible deployment architecture of the SPM solution, "Edge computing", "Cloud" hosting or "On premise".
- › Hot swapping of equipment.
- › Cybersecurity is handled by design.
- › Monitoring of vibration and displacement to check the evolution of these parameters to anticipate a possible failure.
- › Insights into incomplete manoeuvres, abnormal duration of friction phase (short/long), difference in power and power supply faults in switch machines.
- › Cockpit Dashboard to identify your critical assets at a glance.

Hardware

- › Continuous and real time based on acquisition device, sensors, data concentrator and server application
- › Data acquisition on track and/or in signaling room
- › Real-time monitoring
- › CE compliant
- › EMC compliant with : EN 50121-4, EN 61000-6-2, EN 61000-6-4





Smart Point Machine

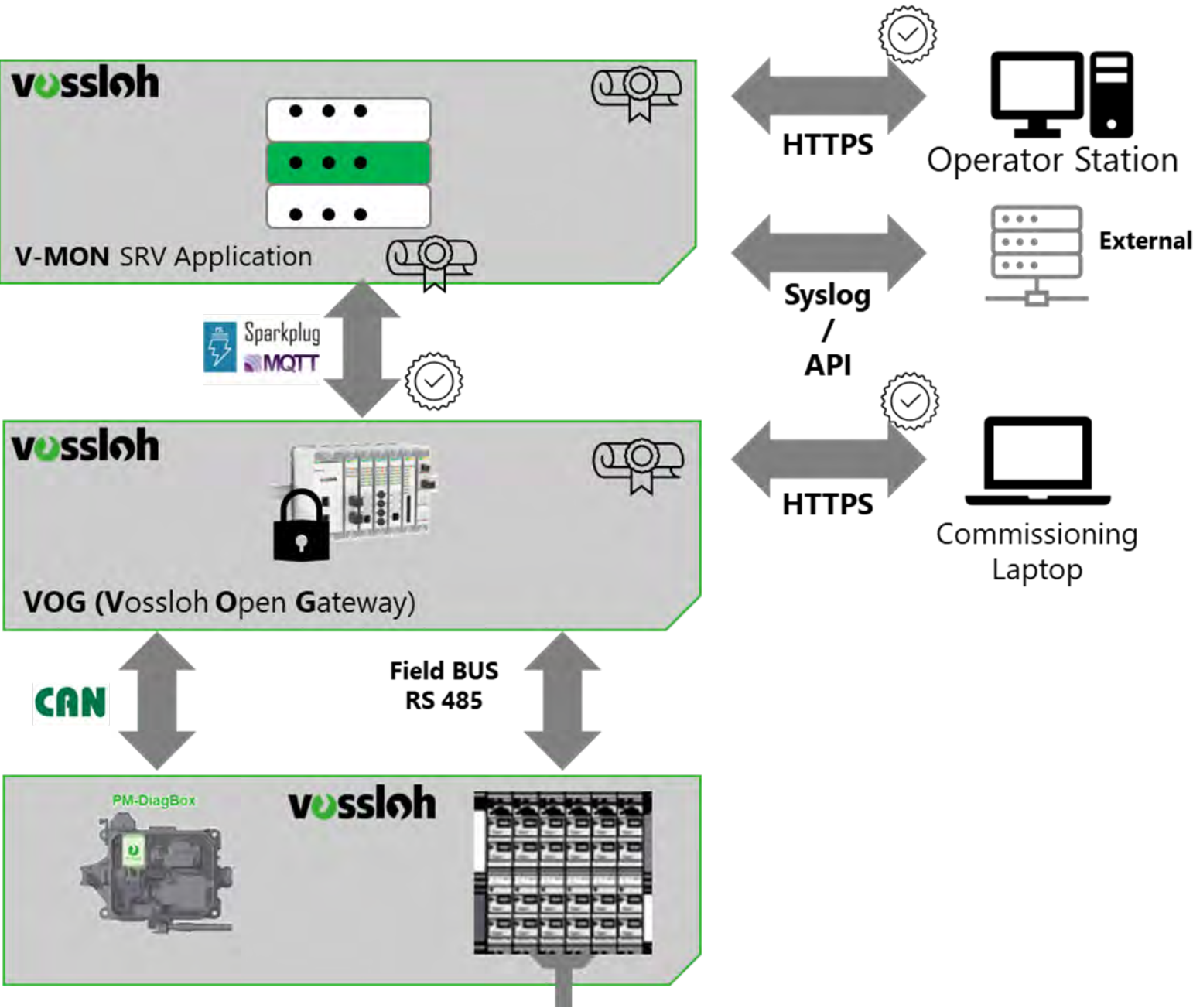
Adaptive monitoring and diagnostics catalyst



Additional highlights

VOSSLOH Open Gateway:

- Data Gateway: OT/IT converter,
- Wide range of data types: serial links (RS485, RS232), CAN BUS, digital inputs, analog inputs,
- Easy to deploy and modular: hot-swappable modules,
- Remotely managed,
- Cybersecurity by design: secure data transfer, secure boot.



Point machine motor power measurement sensor

Measurement parameters	Point machine motor power measurement: current, voltage, active power
Wiring impact	Small impact on existing motor wiring: hall effect sensor
Installation	Daisy chained installation: less wiring
Format	Compact format factory and rail Omega installation
Protection	Input and power supply protected by fuse
Status indication	Status LED: for easy troubleshooting



Point machine DiagBox

Embedded sensor	Embedded motor power sensor: current, voltage, active power
Installation	Installed into the motor case in factory, no safety study needed
Interface	Monitoring interface (connector) segregates from the signaling interface
Management	Remotely managed





Smart Turnout

Vibration-based turnout condition monitoring

Problem description

Reactive and time-based maintenance

We see the need to shift from a reactive and time-based maintenance to predictive and condition-based maintenance for a more efficient maintenance but also to optimize asset lifespan.

Solution description

Predictive and condition-based maintenance

Our solution is an IoT device monitoring vibration at the level of the crossing's nose. It enables the detection of impacts from wheelsets on the infrastructure.

Our solution allows users to identify which turnouts behave abnormally at a glance by providing a dashboard with above threshold behavior. It also helps anticipate evolution of degradation and plan maintenance.

By checking the return to nominal condition, you can confirm the maintenance job effectiveness.

Overall, our solution enables better planning of maintenance activities by adjusting the execution of track jobs.

How it works

Main Features

- › A **cockpit dashboard** to identify your critical assets at a glance and where to deploy maintenance. The proposed alarm threshold can be adjusted to reflect your need of availability
- › The **Monitoring of Vibration and Displacement** to check the evolution of these parameters to anticipate a possible failure
- › The **recognition of train types** to allow you to visualize measurements on a class of train to get more accurate insights
- › The **train speed measurement** to provide an additional factor to get more relevant insights
- › **Battery and 4G strength analysis** for administration of the sensors' fleet
- › Outside temperature

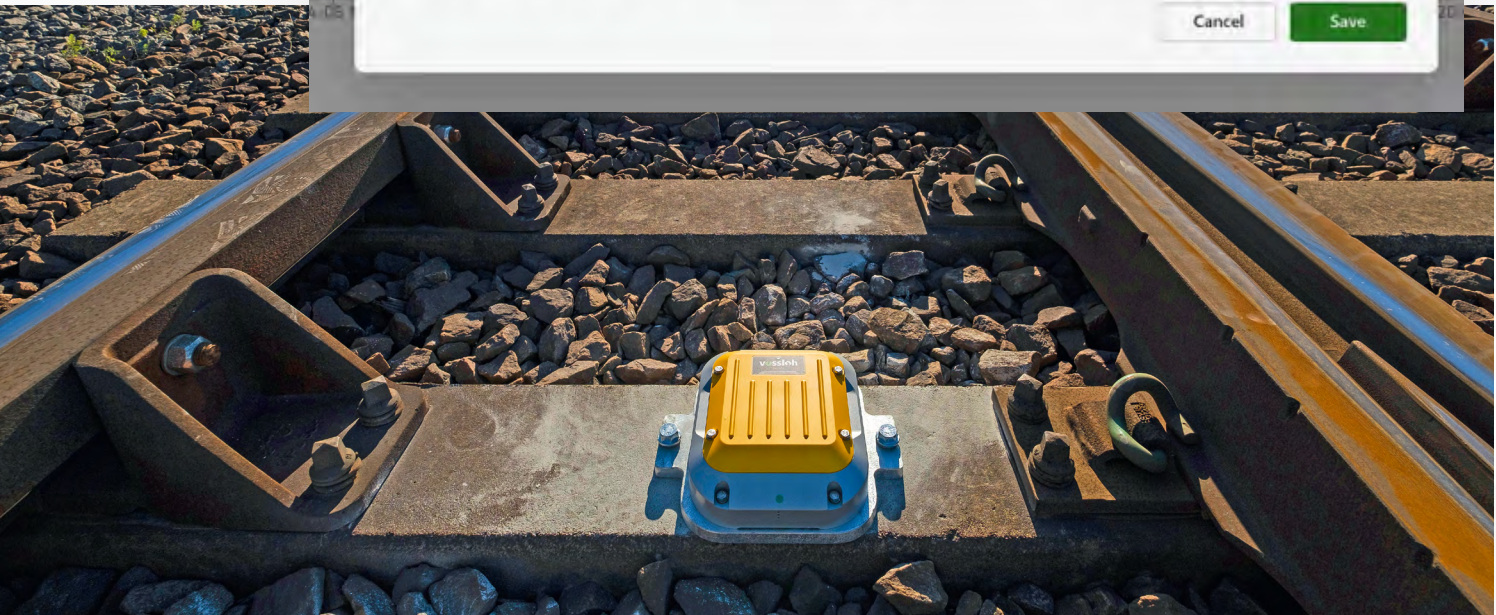
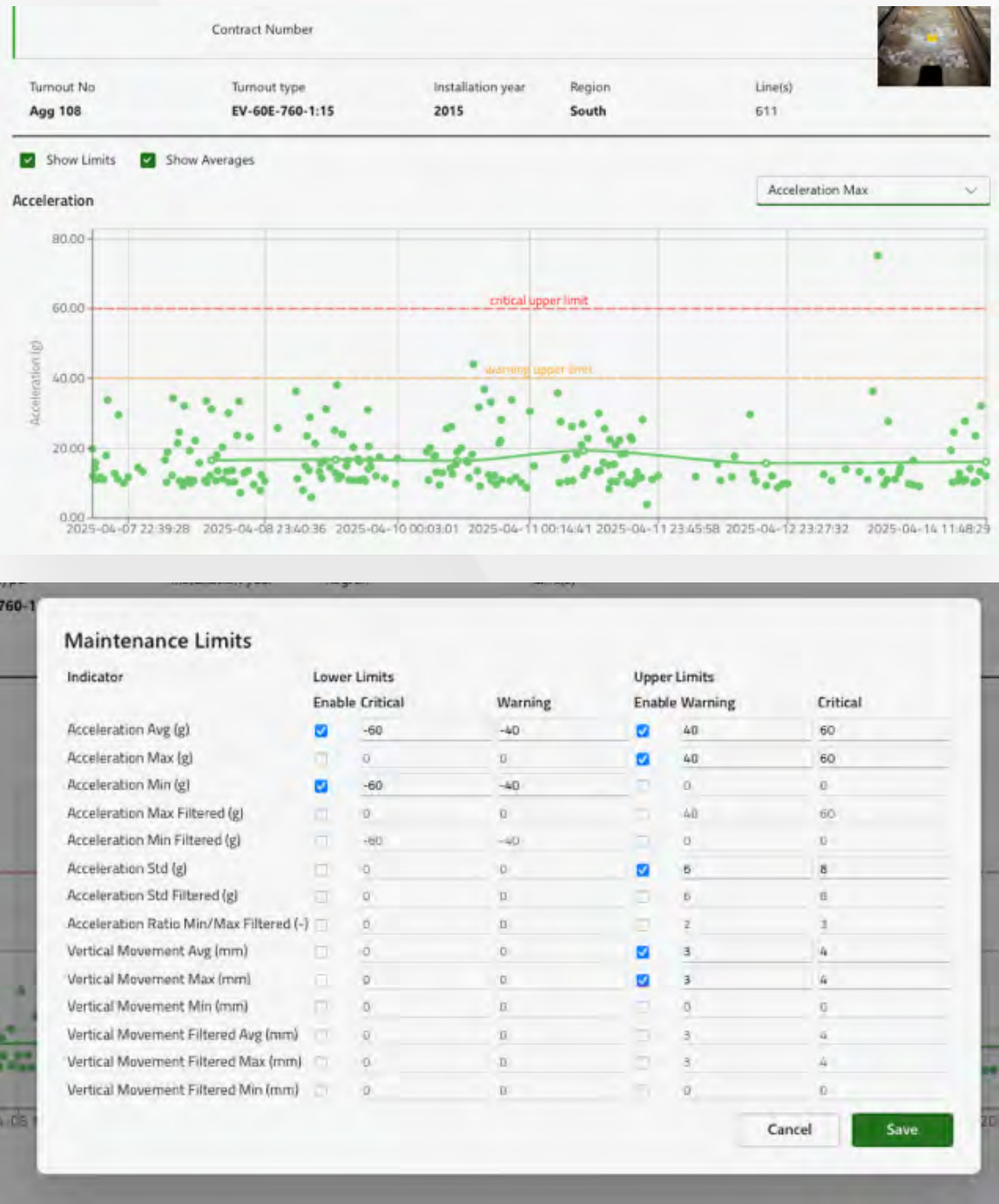
Hardware

Our solution is composed of 2 wireless devices, to avoid complex installation and risks of failure due to damaged cable.

One sensorbox is fixed to the bearer monitoring vibration at a high frequency. The battery-powered device is transmitting data packets to the gateway with a Bluetooth low energy protocol. The transfer of data is done periodically or more frequently depending on the desired balance between battery life and response time (to be defined according to the customer needs).

The gateway is also battery powered and transmits information to the cloud to ensure analysis.

All data transfers are encrypted to ensure safe operations and decrypted only in the cloud.





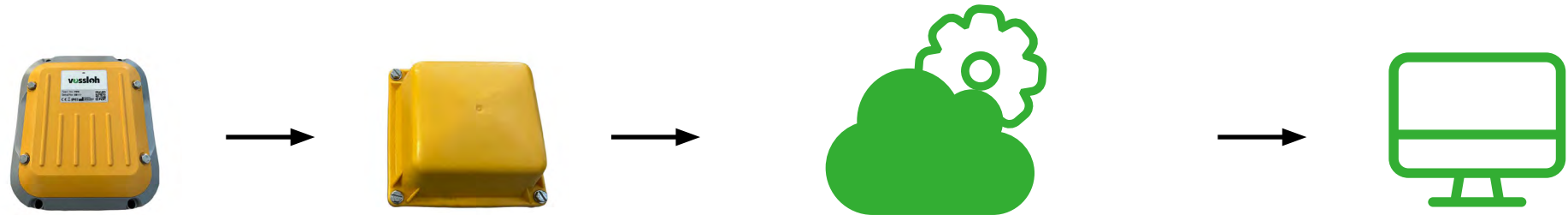
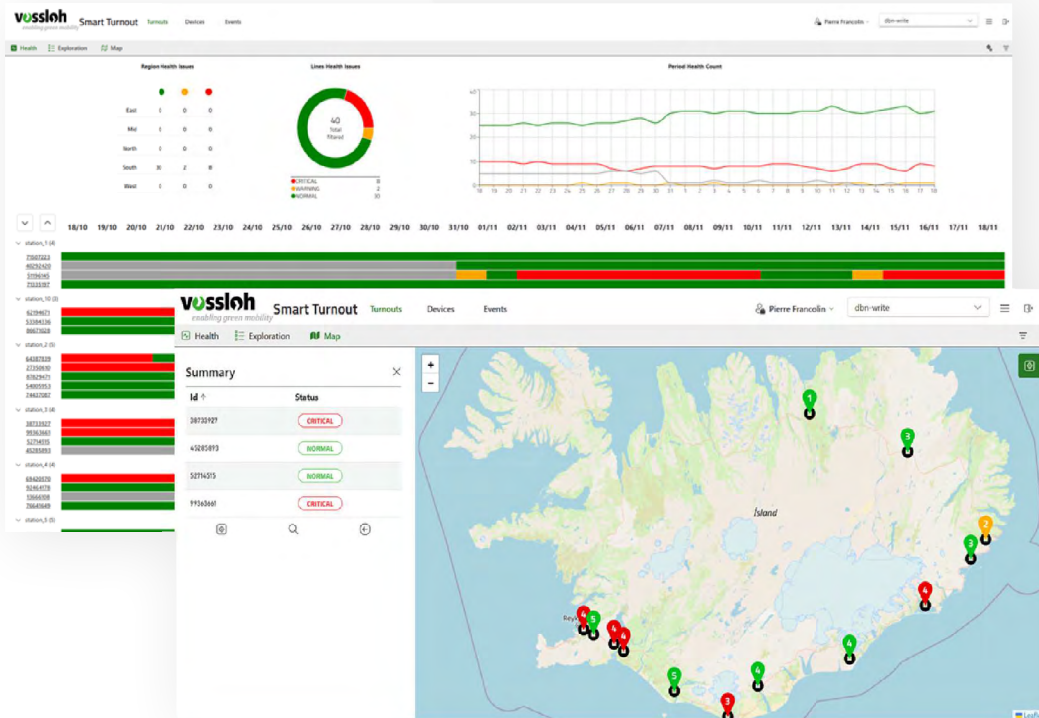
Smart Turnout

Vibration-based turnout condition monitoring



Additional Features

- 24/7 Monitoring: Dynamic, online condition analysis of turnouts under load
- Predictive Insights: Anticipate degradation to schedule timely, cost-effective interventions
- Enhanced Safety: Reduce manual inspections and prioritize resources efficiently
- Train and Speed Recognition
- Identifies train types and speeds to provide contextual maintenance data
- Custom Analytics (Data Labs)
- Develop bespoke algorithms for specific customer needs using real track data
- Customizable dashboards to visualize health of the turnouts using condition indicators



Sensor Box
Capture turnout vibrations data

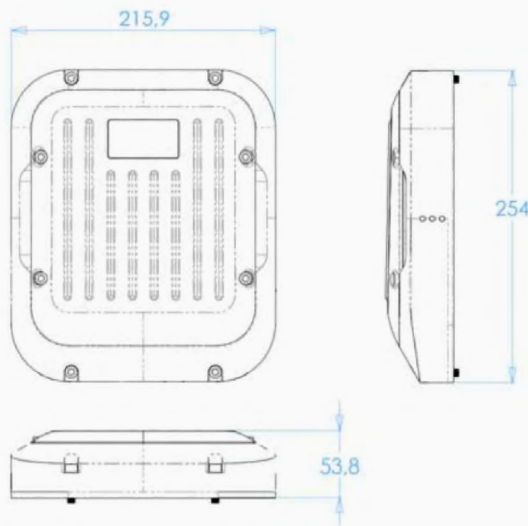
IoT Box
Forwards sensor data to AWS

STO Vossloh
Cloud platform hosted on AWS

User interface
Web interface
Raw data download
Asset management interface

Additional Features

- Advanced algorithms identify trends and provide alerts for critical events, such as:
- Track-bed health trends
 - Validation of maintenance job effectiveness for ballast (tamping) and crossings (welding/grinding)



Sensor Box

Dimensions	215.9 x 254 x 53.8 mm
Weight	2.3 kg
IP Rating	IP67
IK Rating	IK08
Connectivity	BLE (paired with IoT Box)
Data output	Raw acceleration data
Measurement range	±200 g (accelerometer)
Sampling rate	Up to 6400 Hz
Mounting method	Glued/screwed plate mounting
Power	3.6 V / 11.6 Ah battery pack (serviceable)
Battery life	5 years (depends on data transmission volume)
Operating Temperature	-45°C to +65°C

IoT Box

Dimensions	190 x 180 x 140 mm
Weight	7 kg
IP Rating	IP68
Connectivity	4G LTE, BLE (paired with Sensor Box)
Mounting method	Metal pole mounting
Power	2 x 14.4 V / 17 Ah battery pack (serviceable)
Battery life	2.5 years (depends on data transmission volume)
Operating Temperature	-45°C to +65°C



Athena ARCD

Monitoring of broken rails and train presence

Problem description

Real-time rail condition and occupancy awareness

Rail operators need real-time visibility into rail condition and train presence, yet many corridors still rely on periodic inspections or infrastructure-heavy sensing. Broken rails and undetected occupancy can trigger immediate safety and operational impacts, while actions such as slow orders or crew deployment are often based on limited or delayed data.

Fiber-optic sensing can span long distances, but it requires trackside installation, continued tuning to reduce false alarms, and ongoing maintenance. This leaves a persistent gap between operational needs and what complex infrastructure can deliver at scale – driving higher risk and assurance costs.

Solution description

Continuous monitoring without heavy infrastructure

Advanced Rail Condition Detector (ARCD) is a broken-rail and train-presence detection system deployed on more than 2,000 km of track worldwide. The system is designed for shorter monitored segments and delivers proven, high-accuracy detection in active rail operations.

ARCD requires no trackside infrastructure for installation and operates with little to no maintenance. Each unit is solar powered, battery operated, and includes a stand-alone proprietary communications suite that provides real-time back-end connectivity. This communications capability can also serve as a pass-through for other trackside detector datasets.

Through rigorous testing and live deployments, ARCD has demonstrated 100% detection accuracy with a 0.00136% probability of a false alarm.

How it works

Main Features

- › Increased safety through early detection and continuous monitoring
- › Improved operational efficiency through track occupancy analysis
- › Solar powered, battery operated autonomous field hardware
- › Stand-alone communications for back-end connectivity
- › Dashboard site listing with status indicators and maps
- › Little to low maintenance requirement

Hardware

ARCD is delivered as autonomous trackside units that provide rail break and train presence detection. Each unit is solar powered and battery operated, and includes a communications suite that reports status and events to the back end without relying on external communications infrastructure.

The platform supports real-time connectivity for site listings, occupancy views, and system health indicators in the dashboard. The same communications channel can also forward data from other trackside detector systems.

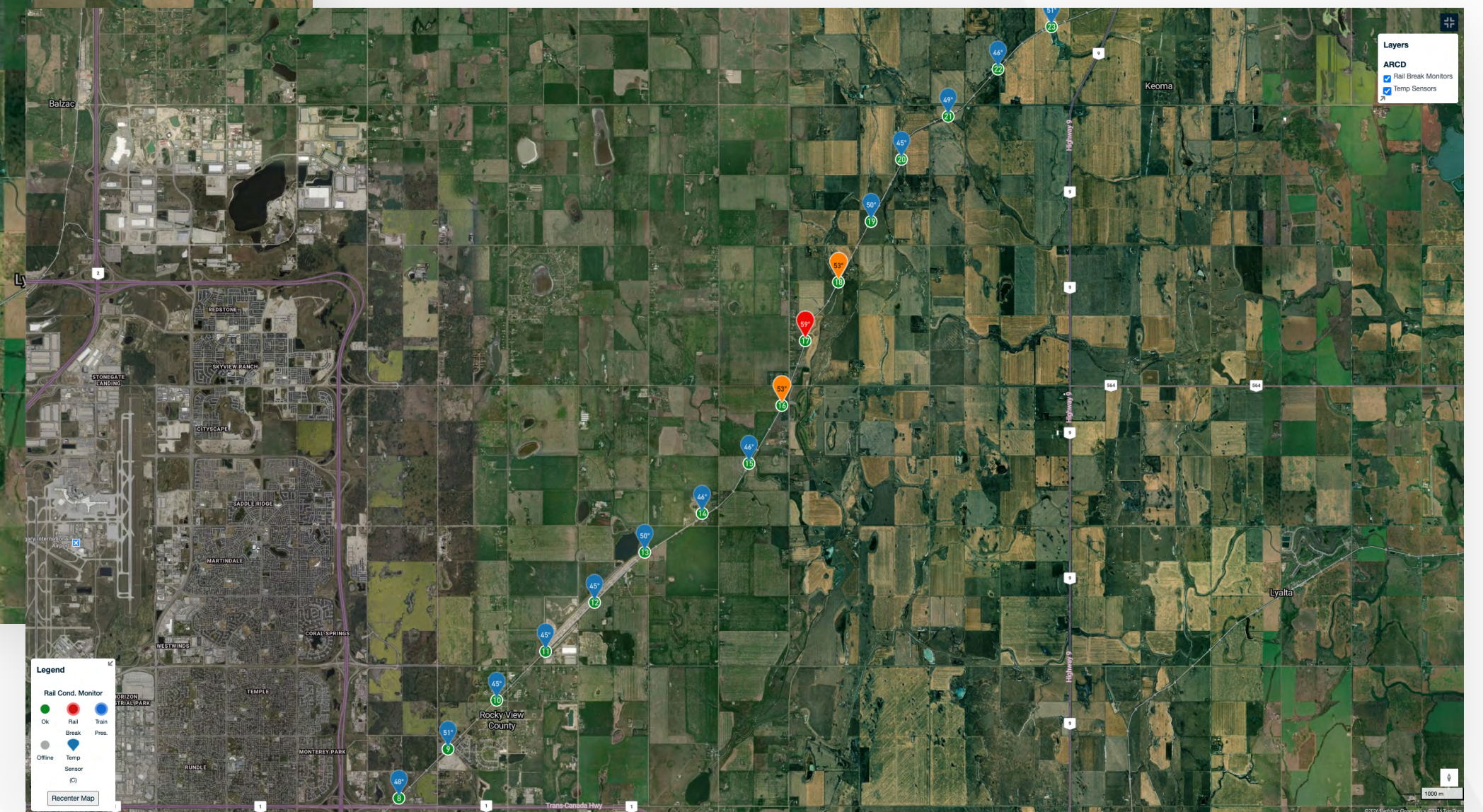
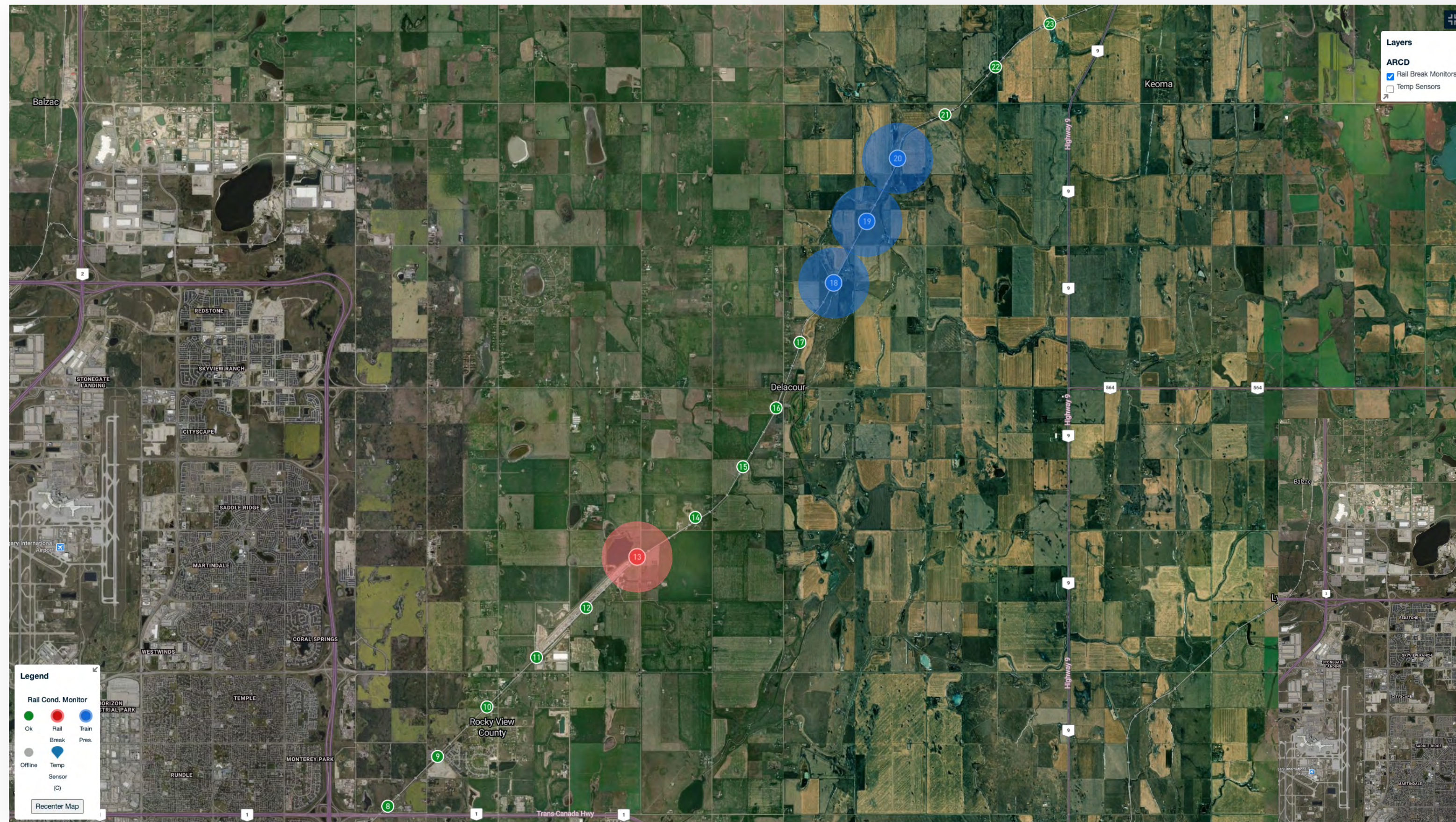
Overall, the hardware approach is designed to minimize installation effort and reduce maintenance load, while delivering continuous monitoring that supports safety decisions and operational analysis across deployed locations.





Athena ARCD

Monitoring of broken rails and train presence





Strainlabs System

Condition monitoring of bolted joints

Problem description

Uncontrolled bolted joint conditions threaten asset lifespan, uptime and safety.

In railway infrastructure, bolted joint integrity is critical. Vibration, temperature changes, settling and dynamic loads can cause preload to change over time. These changes may be missed between manual, time-consuming inspections, increasing the risk of failures, unplanned downtime and safety issues.

Continuous remote monitoring provides visibility between inspections, enabling early warnings and maintenance decisions based on real data.

Solution description

Smart bolts that monitor themselves 144 times per day

Strainlabs smart bolts measure preload and temperature every 10 minutes – 144 times per day. The readings are transmitted wirelessly through a router to Strainlabs Analytics, where users can monitor changes over time and receive early warnings when preload approaches defined limits.

This supports condition-based maintenance, reduces the need for manual inspections and helps prevent unexpected downtime.

How it works

Main Features

- › Wireless smart bolts with built-in preload and temperature sensors
- › Measure bolt condition every 10 minutes
- › Early warnings when preload approaches defined limits
- › Visual dashboards showing current status, trends and history
- › Long battery life with configurable measurement frequency
- › Secured wireless communication via the Strainlabs Router



Bolts

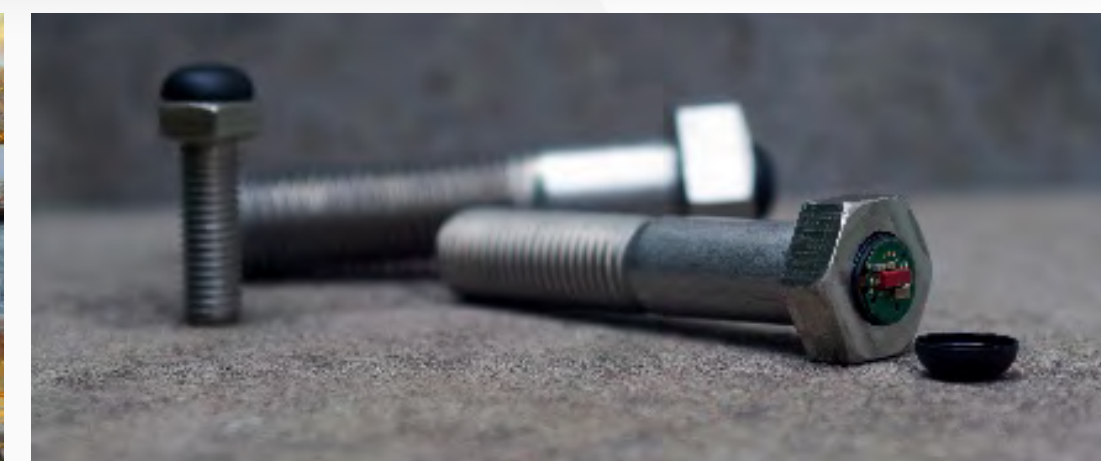
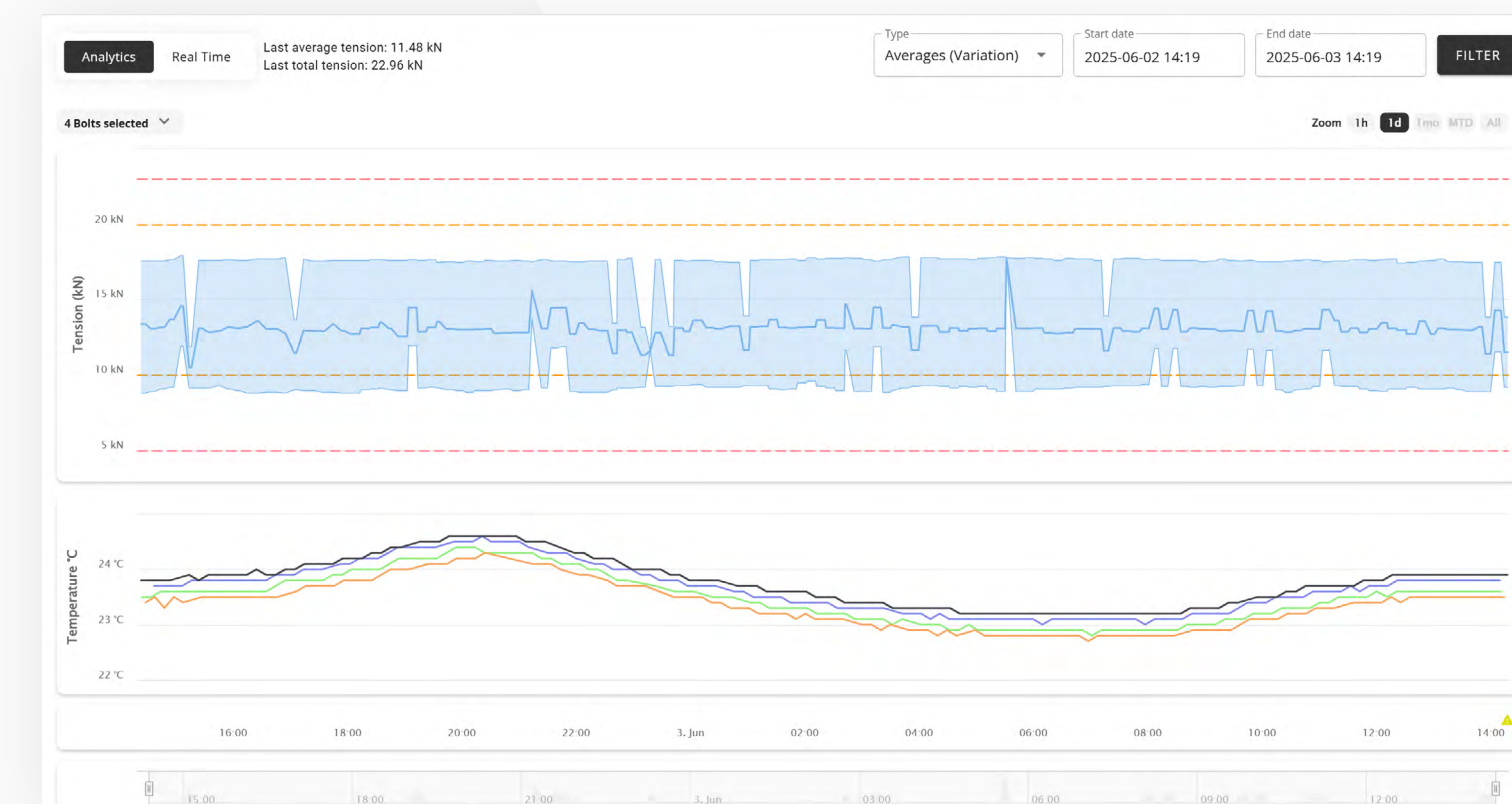
Measure preload and temperature every 10 minutes.

Routers

Pre-configured routers transmit data wirelessly to the cloud.

Analytics

Remote monitoring, alerts, trends and complete history.





Strainlabs System

Condition monitoring of bolted joints

Strainlabs App

Verify bolt preload on-site in seconds

The Strainlabs App connects directly to Strainlabs smart bolts via Bluetooth and displays preload, temperature, proof load, battery status and stored history on your phone.

- › Works offline
- › No router or network required
- › Ideal for installation, service and inspections
- › Can be used independently or as an on-site complement to the Strainlabs System

The App gives you answers on-site. Strainlabs Analytics gives you monitoring over time. The app is available for iOS and Android.



BOLTS

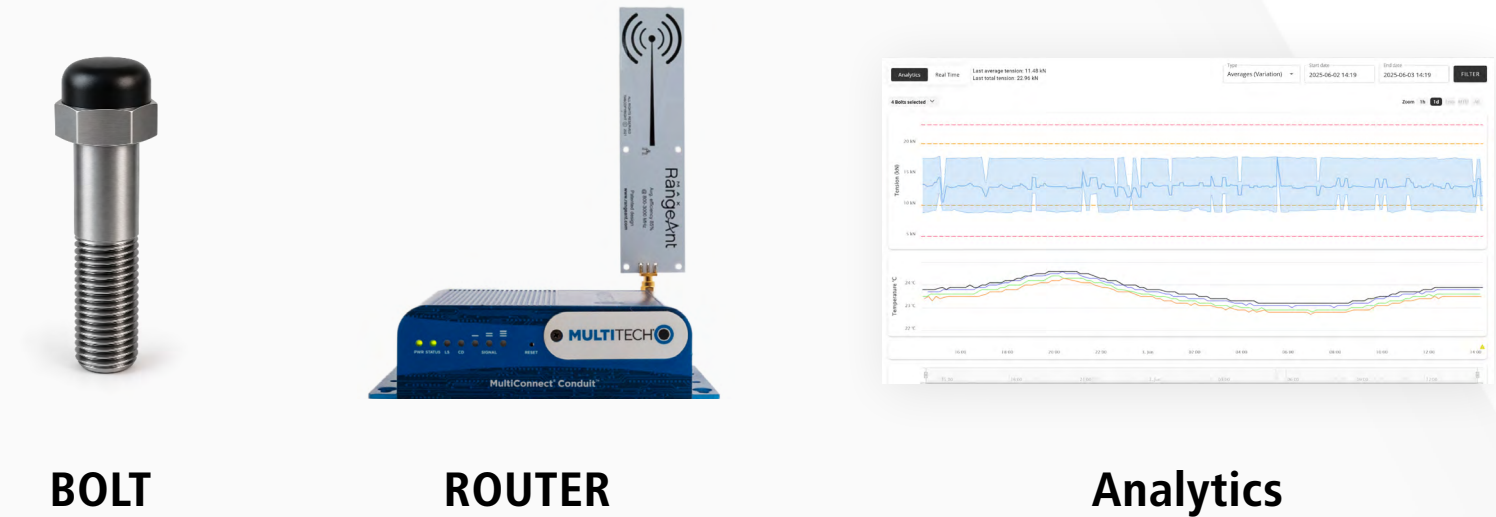
CE-marked	with Intertek
Standard sizes	M10, M12, M16, M20, M22, M24, M27, M33, M36
Length	30-200 mm
Steel classes	Steel 8.8, 10.9 or 12.9
Stainless steel	A4-70, A4-80 or Bumax® 88, 109
Special alloys	Yes
Type	Hex head, fully or partially threaded ISO 4014/ISO4017
Operating Conditions	› Minimum clamp length: 10 mm › Temp range -30°C / +70°C
Preload Monitoring	› Tightening mode: Direct feedback › Active mode: Every 10 minutes (reduced interval when below 0°C) › Pre-calibrated alert levels, adaptable
Additional IOT Features	› Temperature data & thermal compensation › Microcontroller / Smart battery management › Unique ID, position & time tracking › Band with ISM 2,4 GHz › Proprietary protocol
Battery Lifetime	Simulated to 5 years in environment (extendable if lower sampling frequency <1ms/10min)

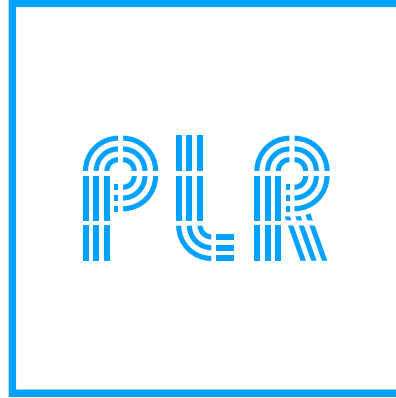
ROUTERS

Type	Industrial IoT router from Multitech®
Software updates	Automatic & remote
Communication	Ethernet/LAN, Wi-Fi, 4G LTE, 5G
Range	Stable up to 90 meters (extended via antennas/amplifiers, free space)
Power Connection	100–240 V, includes EU & UK adapter
Antenna	RangeAnt MAX +3dBi Omnidirectional

Analytics

Installation	Agnostic – in the cloud or installed locally
Monitoring	Site-level overview, scalable down to specific bolts
Functionality	Visualizes measurement data, tracks bolt IDs, routers, locations, and preload alert levels
Value	Aggregated data supports asset planning and product development
Potential	Enables future analysis with AI & Machine Learning





Pulsar

AI-powered train identification and condition monitoring

Problem description

Pulsar for optimizing processes and security across rail networks

Harbours, terminal and chemical parks often lack precise train data upon arrival, relying on inaccurate wagon lists. This leads to issues with wagon sequence, load position, and liability for damages.

Additionally, mainline operators, S-Bahn, and tram networks face an increasing amount of Graffiti on their wagons, which often only gets noticed once the sprayed vehicle is back in service - sometimes not until a passenger complains. By then it's already shaped how hundreds of riders see operation that day.

Our solution uses various sensors, such as cameras and microphones, to capture and analyze train data and provide accurate information within minutes.

This helps optimize operations, prevent disruptions, reduce liability risks, and enhance safety and productivity — for private infrastructure operators as well as mainline, S-Bahn, and tram operators alike.

Solution description

Pulsar for optimizing processes and security in private networks

The Pulsar is an innovative, AI-driven monitoring system consisting of various cameras, microphones and other sensors that are installed in a weather-proof housing.

Thanks to its compact design, it can be set up within 1-2 days and does not require any intervention in the track or a superstructure of the track.

In operation, the system recognizes an approaching train and captures all relevant information about the train as it passes by. This information is made

available a few minutes later in our online dashboard or transmitted directly via an interface.

The Pulsar is available in different versions:

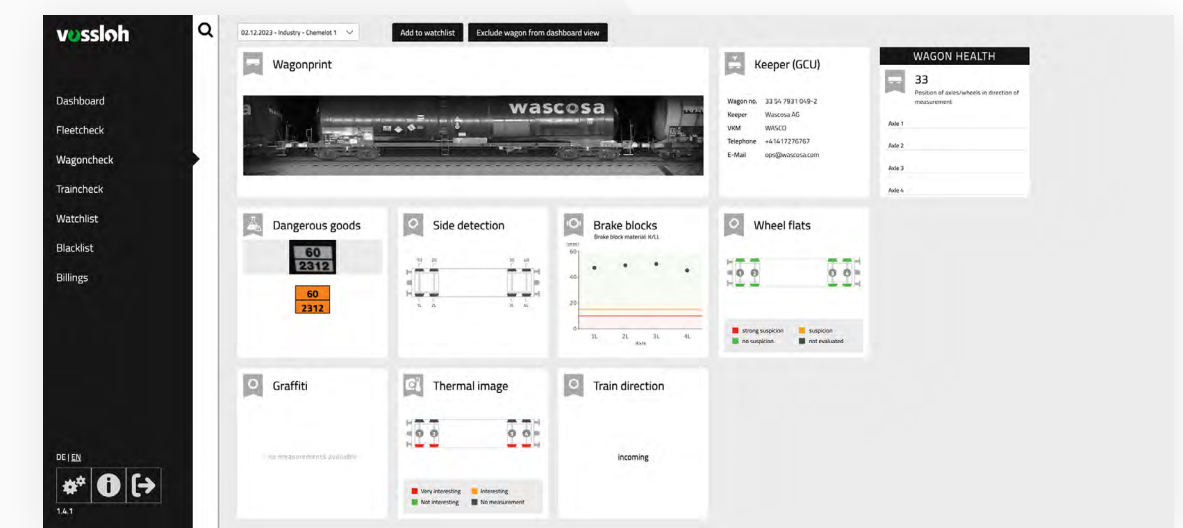
- › The standard Pulsar is fully equipped and upgradeable
- › The MicroPulsar excludes information about brake block thickness and potential wheelset damage and is upgradeable with a camera mast
- › For a first glance at the technology, the mobile Pulsar is fully equipped and can be used for testing

How it works

Main Features

- › Each wagon is uniquely identified by its UIC number, read visually with 99% accuracy and backed up by RFID if the number isn't visible.
- › For loaded intermodal wagons, BIC codes (containers) or ILU codes (semi-trailers) are linked to the UIC number, speeding up loading and unloading.
- › The exact arrival order of wagons, letting you quickly check wagon lists against actual train composition.
- › High-resolution images enable visual inspection, revealing external damage and, depending on wagon type, clues about the load.
- › Hazard placard recognition identifies wagons carrying dangerous goods, including hazard number, UN number, and relevant substance/hazard information.
- › Detects graffiti on the vehicle and shows which areas are affected.
- › Reports brake block condition, including thickness and photo evidence, linked to specific carriages and axles for targeted maintenance planning

- › Detects anomalies indicating wheelset damage, flat spots, build-up, or spalling, with an audio file of the affected carriage.
- › Thermal imaging reveals wheel condition, detecting issues like overheating wheels or seized brakes
- › A top view complementing the exterior view, revealing conditions like open dome hatches or load indicators.



Mobile Pulsar



Pulsar

AI-powered train identification and condition monitoring

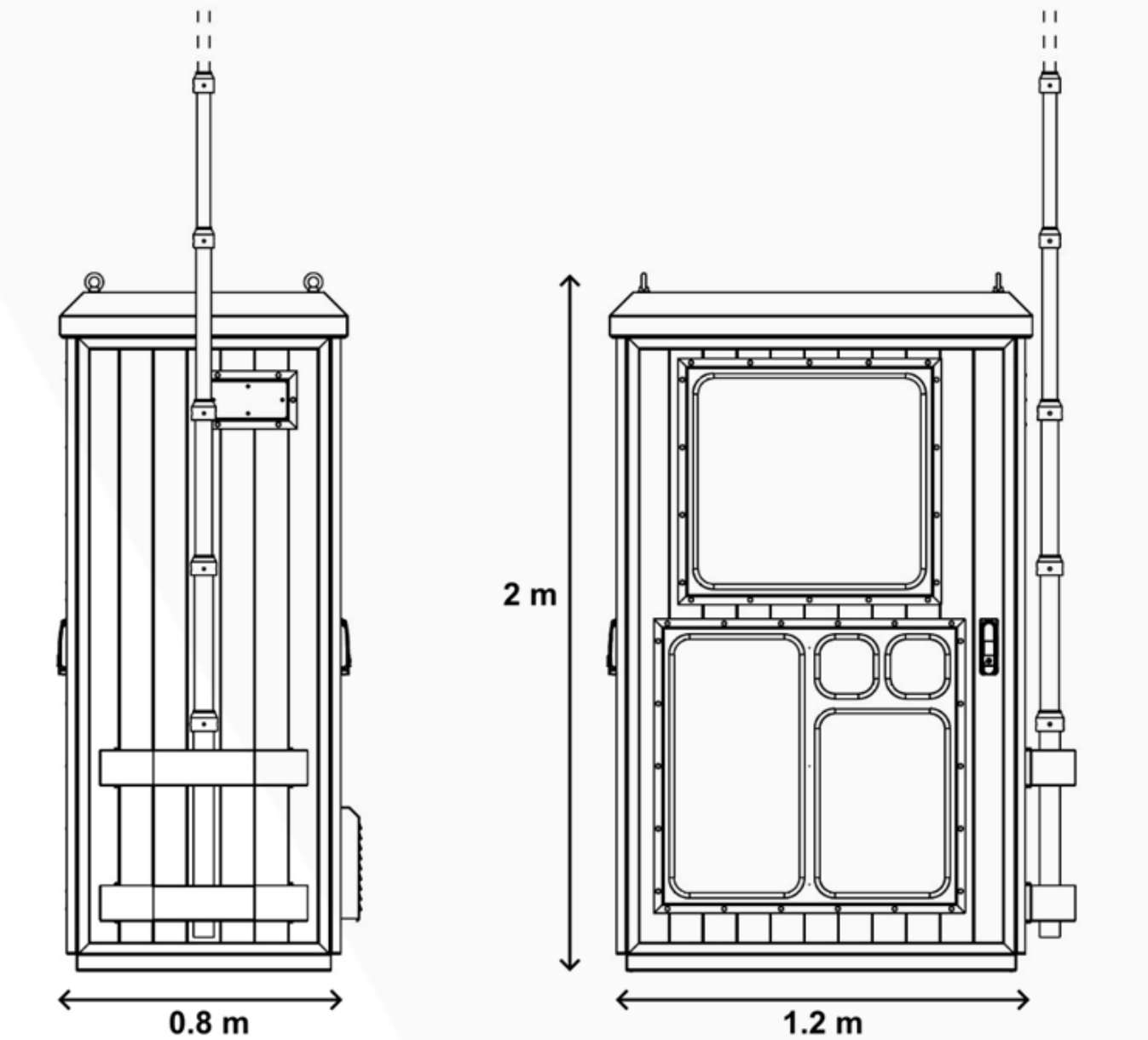


Additional Features

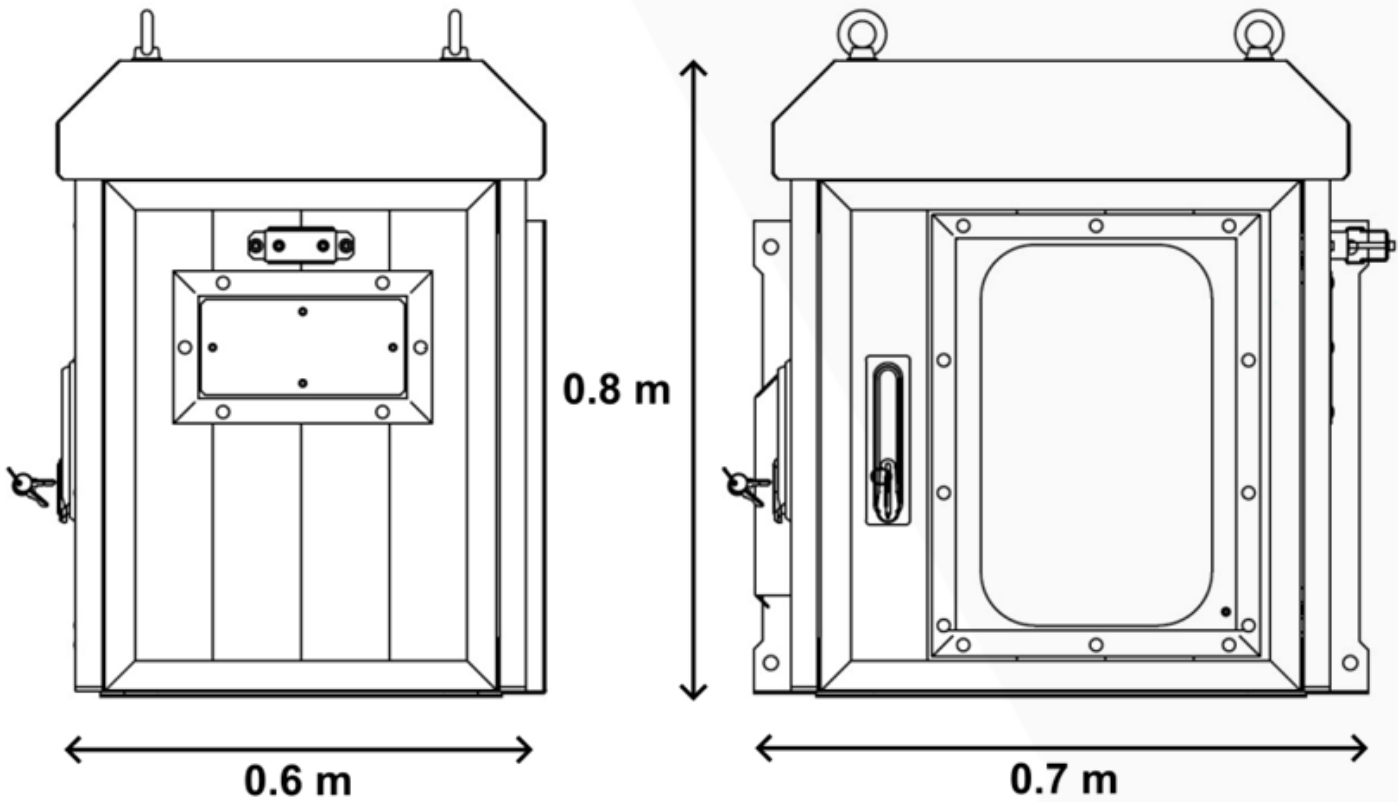
- Upgradable to record wagon top images (camera mast)
- Upgradable to record thermal anomalies of the wheel



Standard Pulsar



Technical drawing standard Pulsar



Technical drawing MicroPulsar

MicroPulsar

Pulsar

Power	110-230 V / 50/60 Hz AC
Dimensions (without mast and base plate)	Standard Pulsar: 1.2 x 0.8 x 2 m MicroPulsar: 0.7 x 0.6 x 0.8 m Mobile Pulsar: 3.8 x 1.8 x 2.1 m
Weight	Standard Pulsar: 300 kg + base plate MicroPulsar: 50 kg Mobile Pulsar: 750 kg
Sensor systems	Pulsed monochromatic or colored LED / camera systems (2x Standard Pulsar + Mobile Pulsar, 1x MicroPulsar) RFID detection system Two stereoscopic directional microphones (Standard Pulsar + Mobile Pulsar) Thermal camera extension (Standard Pulsar + Mobile Pulsar)
Installation time	1 – 2 days, no trackwork required
Max. distance to track	Up to 8 m
Max. speed (LED/camera + RFID systems):	200 km/h
Connectivity	LTE / 5G, LAN possible



S-scan

Near-Surface images for subsoil characterization

Problem description

Potential safety risk of subgrade instability

Geophysics is a valuable tool for geotechnics, providing a rapid and non-destructive understanding of the subsurface. By combining the two disciplines, a more comprehensive analysis can be obtained, optimizing safety and cost-effectiveness in railway infrastructure activities allowing to answer key problems:

- › How to maintain train circulation at the required level keeping rail infrastructure efficient
- › How to detect and prevent cavities under the ballast easily and quickly
- › How to detect weak zones and geologic hazards
- › Evaluation of soil and rock mechanical properties
- › How to validate quality control of soils after compaction or reinforcement work
- › How to optimize drilling locations for injection

Solution description

Transform data from the subsurface and infrastructure into an intelligent and actionable projection and secure infrastructure

Geophysics is a valuable tool for geotechnics, providing a rapid and non-destructive understanding of the subsurface. By combining the two disciplines, a more comprehensive analysis can be obtained, optimizing safety and cost-effectiveness in railway infrastructure activities allowing to answer key problems enabling stakeholders in rail sectors to make better and faster decisions, while balancing operational performance with environmental responsibility.

Our solution allows to explore and map the underground structures.

We are using seismic waves generated by train that act as strong, repeatable, and cost-free seismic sources.

These vibrations propagate as surface waves and can be recorded by nearby seismic arrays.

With proper processing, train-induced waves act as a passive, but highly energetic, seismic source.

Subsurface data intelligence for sustainable performance

Fast data delivered on reliable pace

- › Generate predictive insights, rely on intelligent monitoring for better decision-making.
- › Ensure secure optimization of existing operations.
- › Monitor and analyze infrastructure using predictive analytics to anticipate incidents, minimize risks, and ensure reliable operations.
- › Quickly transform data into actionable knowledge through integrated solutions.
- › Non-intrusive method for minimal environmental impact and social acceptance saucerization

Product description

- › DFU-1C Node + Scan processing for audit (battery powered)
- › DAS fiber + Scan processing for Monitoring

Two different seismic sources are possible:

- › Train-induced surface waves (Rayleigh waves generated by trains, most popular)
- › Hybrid: Surface-Waves with Uncontrolled or opportunistic Sources



S-scan

Near-Surface images for subsoil characterization





Trackscope

Central dashboard bundling all infrastructure data



Problem description

Data spread across many systems

Rail operators rely on a growing number of condition monitoring systems, sensors and legacy platforms. Each one generates valuable data, but it is often kept in separate silos. Bringing this data together into one clear picture takes time and makes it harder to see the full condition of the infrastructure at a glance.

Solution description

One central view of all infrastructure data

Trackscope is a visualization web platform that brings infrastructure condition data and sensor data together in one central place. It links existing data sources with new ones, giving rail professionals a unified, easy to navigate view of asset conditions across their network. With advanced filtering options and customizable views, users can combine legacy systems and new solutions to gain deeper insights and manage asset availability more effectively, without switching between multiple systems.

How it works

Main Features

- › Integration of existing and new data sources, including non-Vossloh products and data sets
- › Cockpit dashboard for centralized data access
- › Customizable filters and views

Use-Cases

- › Prevents data silos when multiple data sources already exist
- › Supports maintenance planning through data-driven decisions
- › Increases asset lifespan, as all available data is considered and combined for deeper insights
- › Reduces overall costs, as maintenance shifts can be planned more effectively and asset life is extended



MR.pro

Asset management software for track networks



Problem description

Infrastructure managers struggle with the lack of reliable data, or too many unstructured data, without information over the entire network

All infrastructure managers need to focus on their budget, where at the same time they need to keep up with KPI's such as availability, punctuality, passenger comfort, noise and vibration issues.

At the same time they must meet the minimum safety issues and threshold values of their assets and verify those against official authorities on a regular basis, which is normally done by measurement and visual inspection.

Usually they also have no clear overview about the impact of the taken maintenance measures, early and future diagnosis of upcoming failures or investment budget in long-term.

They are stuck in several software solutions or simply not digitally readable, fragmented documentation of operational and master data.

As a result, they are currently not accountable for the actual condition of their track system and in a poor negotiating position with their budget provider.

Solution description

Asset management System with all relevant data and all relevant processes in one structured database – digital twin

The software consists of four pillars:

1. Expert System

Inventory and status data, measuring inspection data and interfaces to any measurement system. Automated expert advice during inspection.

2. Data Management

Localisation and assignment, Object database framework

3. Maintenance -Management

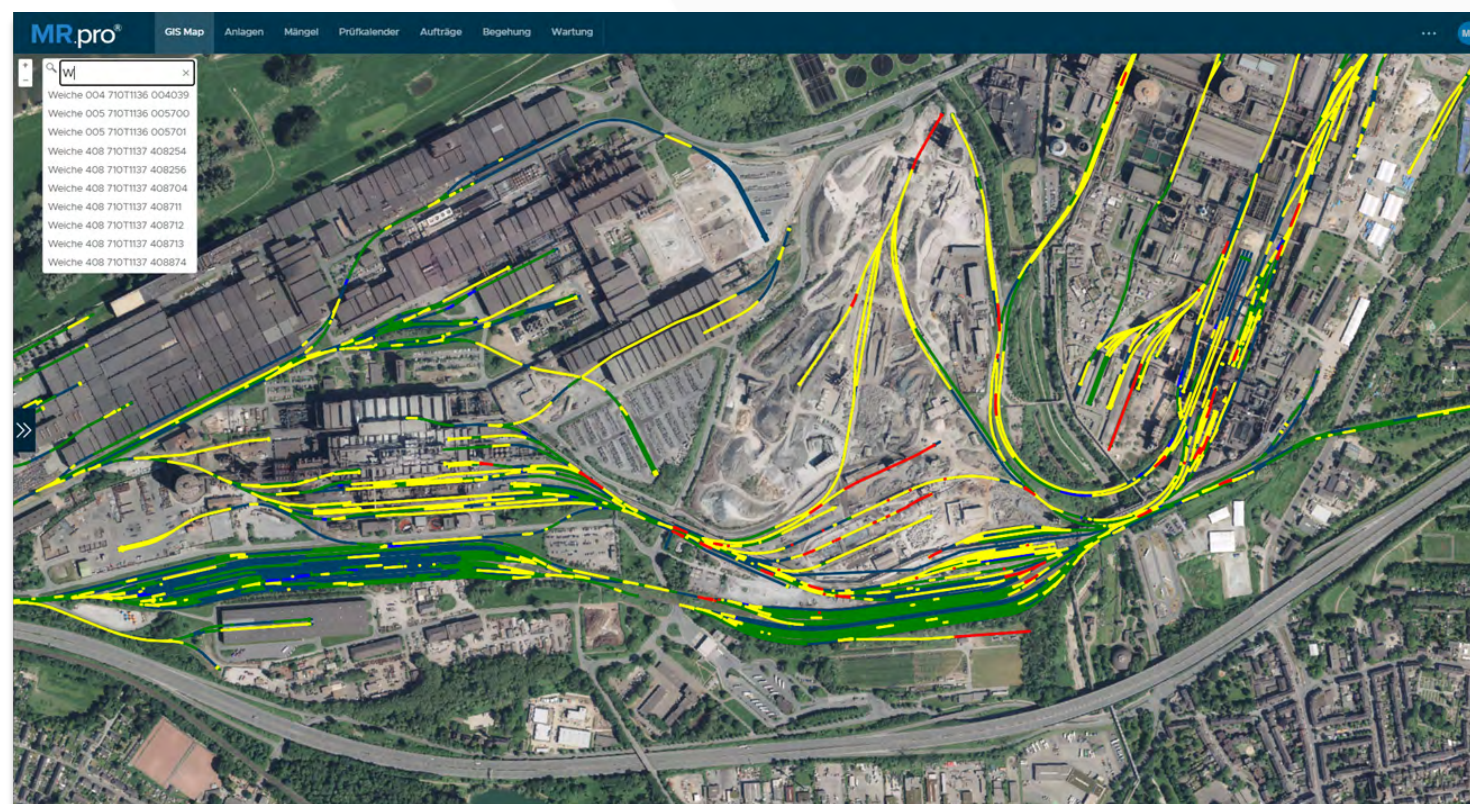
Analyse, plan, conduct and control all maintenance measures related to each object

4. Asset Management

Substance Evaluation, Lifespan, Investment / Renewal Strategy, Optimized Configuration, lessons learned, Technical Controlling and with interfaces to ERP systems like SAP commercial controlling.

Consequently gathering relevant data leads to a digital twin. It allows on site inspection and maintenance surveillance. The entire network and every single object with all relevant information appears synchronized in your pocket.

The substance evaluation of every single object leads to the wear reserve index (KAV) for the entire network. Stable quality, safety KPI's guarantee a long term planning without surprises. The right maintenance regime reduces average costs in the long term.



Additional Features make life easier

Out of the daily use by inspection experts, the features are practice-driven for 25 years

- › **Georeferencing:** The GIS Map Viewer is used to quickly identify objects
- › **Life history:** Learn how your assets behave and make predictive maintenance happen
- › **standardized modules** for the structured recording of master and condition data
- › **Preconfigured Object Types**, such as switches, Tracks, Buffer stops, Level crossings, Platforms, Bridges, Point machines, signalling, Catenary / masts
- › **Mobile App:** Defects can be recorded at any time on mobile devices and made available to all users as centrally stored information
- › **Authority proven and conform inspection reports**, stay always legally compliant

Hardware

Due to the cloud structure, any internet-enabled device can be used. Measuring data can be imported via a manufacturer-independent interface manufacturer-independent.



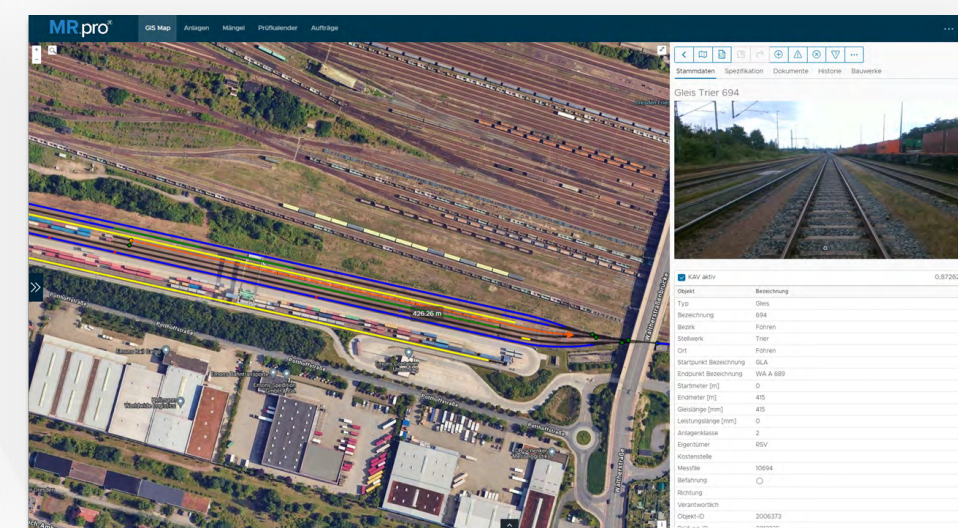
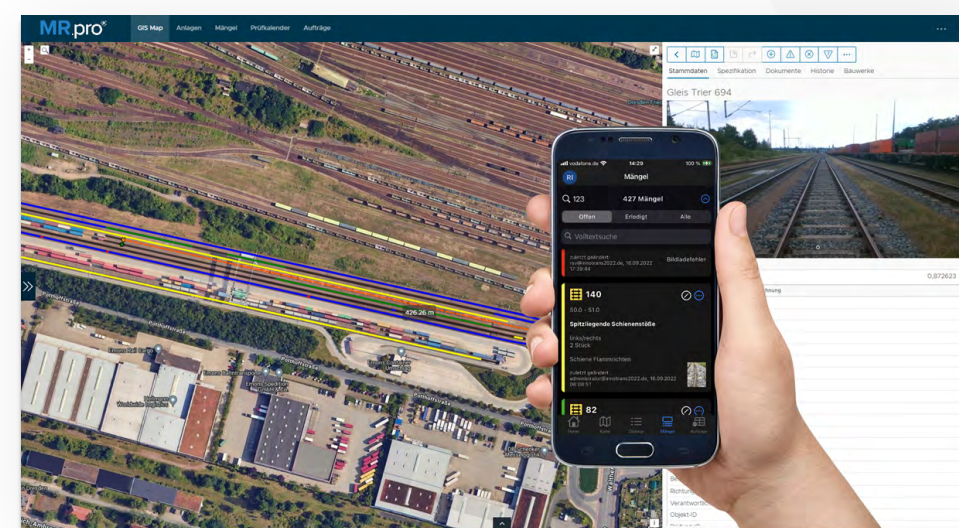
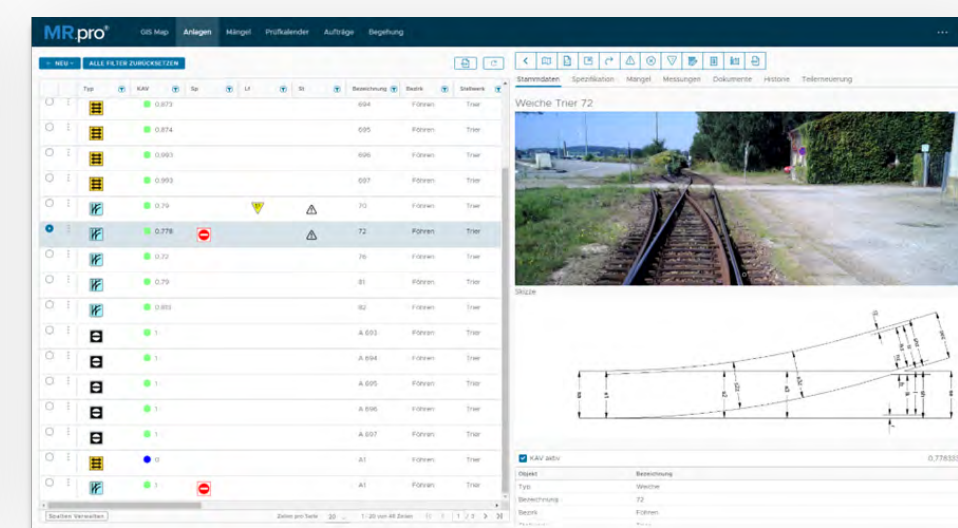
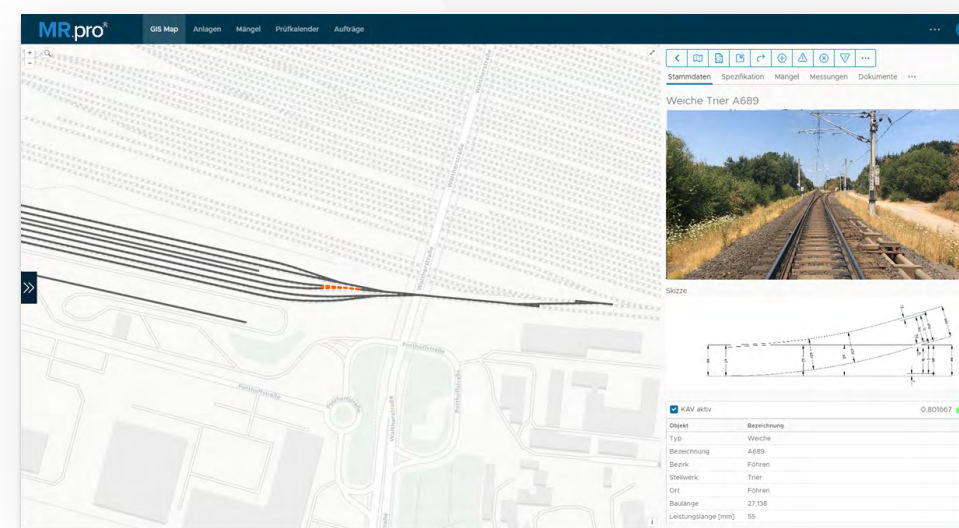
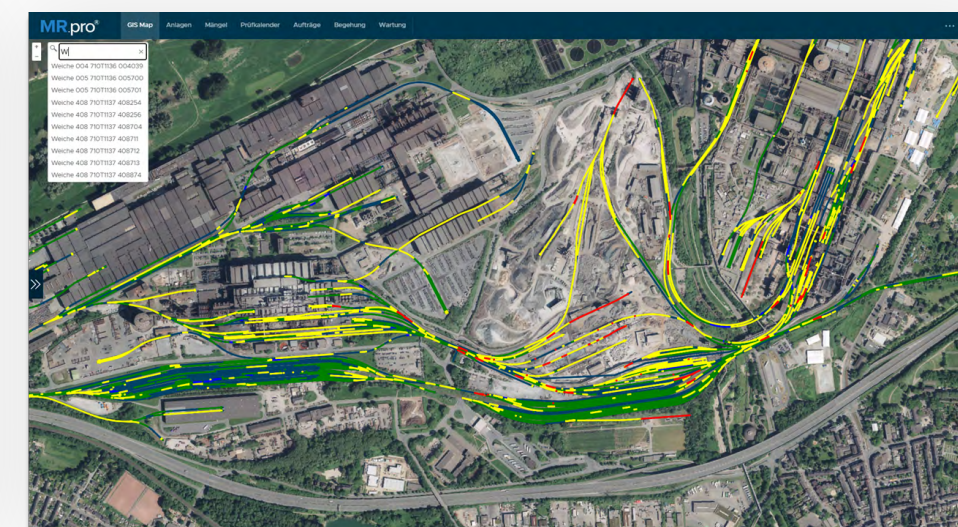
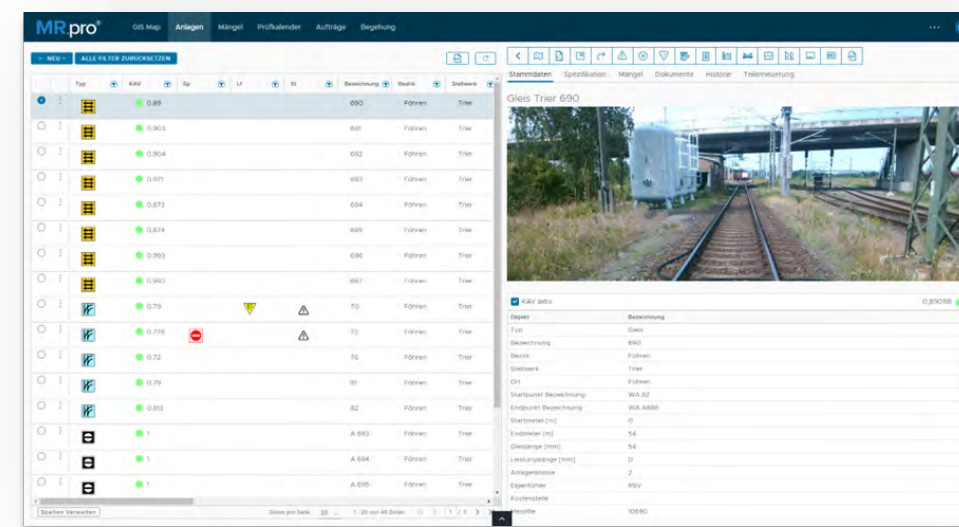
MR.pro

Asset management software for track networks



Additional Features

- **Maintenance Management:** the software consists of a full planning tool with interface to SAP
- **Dashboard:** Have your entire network condition / KPIs in one view
- **Failure classes:** Defined by user / regulations, normally class 1 - 4
- **Multi-user system:** Online application and graduated user & rights management
- **Multilingual:** stored tables enable quick switch between languages
- **Expert System:** developed directly by experts and with high practical value
- **Effort reduction:** planning, control and documentation efforts reduced significantly



MR.pro® Inspektion

Kunde	Demo, Musterstadt
Weiche/Nr	G07
Bezeichnung	Kohlebrunnen
Startpunkt	WE 12
Endpunkt	G07
Anteil/Länge	231.00
Profilnummer	20.11.2017

Bauwerke

Anfang (m)	Ende (m)	Bauwerk / Einrichtung	Zustand
Keine Einrichtungen			

Spezifikation

Anfang (m)	Ende (m)	Schienenform	Schwellen/Endeckung	Befestigung
0.0	4.0	S49	(B)	K-Bau
4.0	15.0	S49	n.g. / Betonglatten	n.g.
15.0	113.0	S49	(B)	K-Bau
113.0	115.0	S49	(B)	K-Bau
115.0	116.0	S49	(B)	K-Bau

Mängel

Id.Nr.	Anfang (m)	Ende (m)	Laage	Rollen verschmutzt	Mangelbeschreibung	Umfang	PK
1	4.0	113.0	links/rechts	verschmutzt	Laaschenschutt Höhenversatz	4.m	3
2	37.0	37.0	links/rechts	verschmutzt		0	3

Instandsetzungsinweise:

Nr.	Instandsetzungsinweise	Eintrag
1	Rillen reinigen	14.12.2021
2	Überangasschen einbauen	14.12.2021
3	reineigen	

Datum der Prüfung: 20.11.2017

Profil: G07

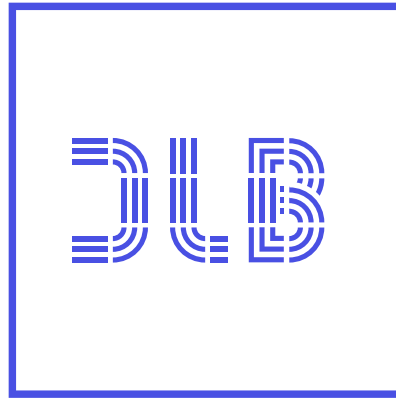
Benutzter Mängel: 1

Der ordnungsgemäße bzw. betriebssichere Zustand (B24 Abs.1 BOA) wird beschneigt

G07

Seite 1 / 2





Data Lab

Advanced rail infrastructure data analysis software

Problem description

Generating useful insights from data

The data science field has a lot to offer to optimize railway maintenance operations.

We want to build metrics that reflect as closely as possible specific aspects of the reality on the track.

Finding relevant and actionable insights can be a challenge.

For an insight to be useful and actionable, it must be relevant and trustworthy.

Our aim is to create a link between the metrics and the real world. The Data Lab endeavours to facilitate the discovery of these usable insights.

Solution description

Unlocking trustworthy insights

The Data Lab is meant to address a wide variety of monitoring data sources and types.

It offers a rich data visualization interface and a large data science toolbox, allowing data scientists to quickly access the data collected and inject their insights into the system.

The Data Lab provides a place for exchanges between all the expertise needed for the meaningful utilisation of the collected data.

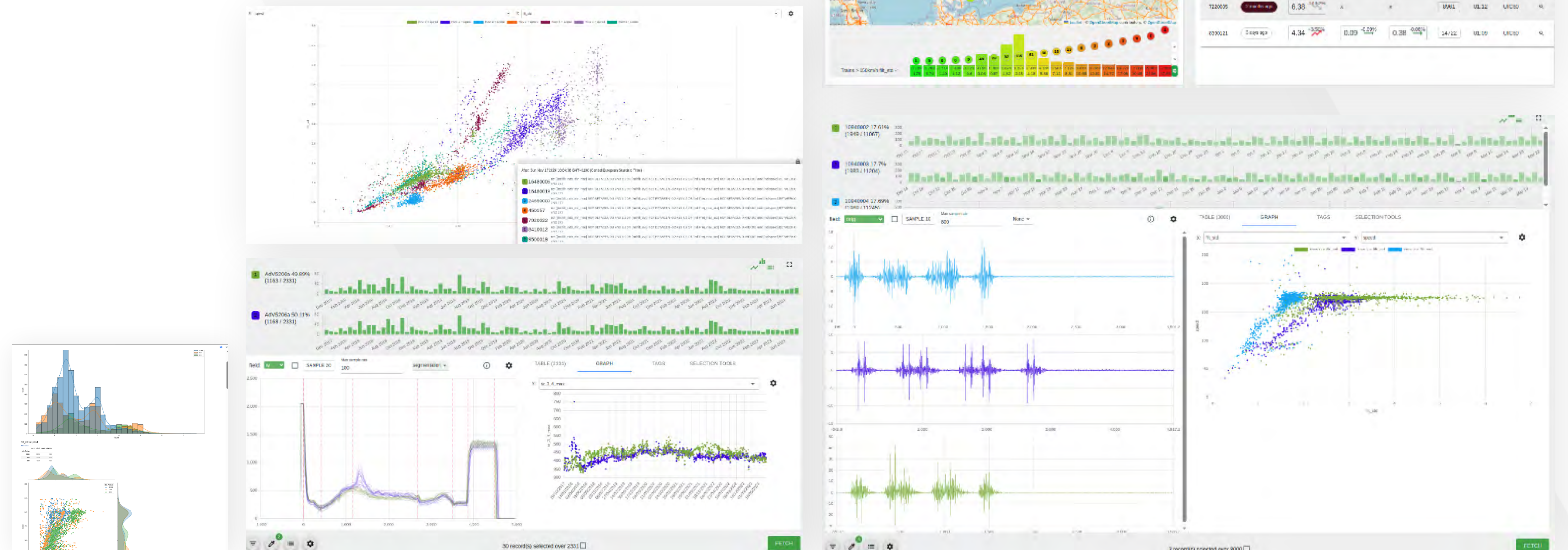
Data Lab workshops enable the establishment of a feedback loop between data scientists, maintenance and tracking experts.

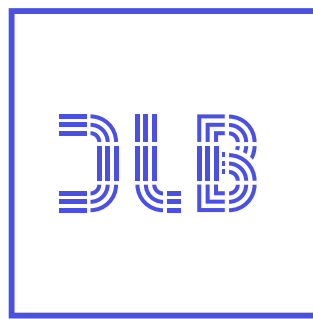
This helps to define the target functions and build trust and understanding of the insights gained.

How it works

Main Features

- Dashboard: quick look at your fleet.
- Advanced querying tool: find exactly what you are looking for.
- Track events: link data to the field.
- Alarm studio: create your alert setup and simulate alarms on historical data.
- Report generation: generate custom reports to further analyze your fleet. Each report type has its own focus.





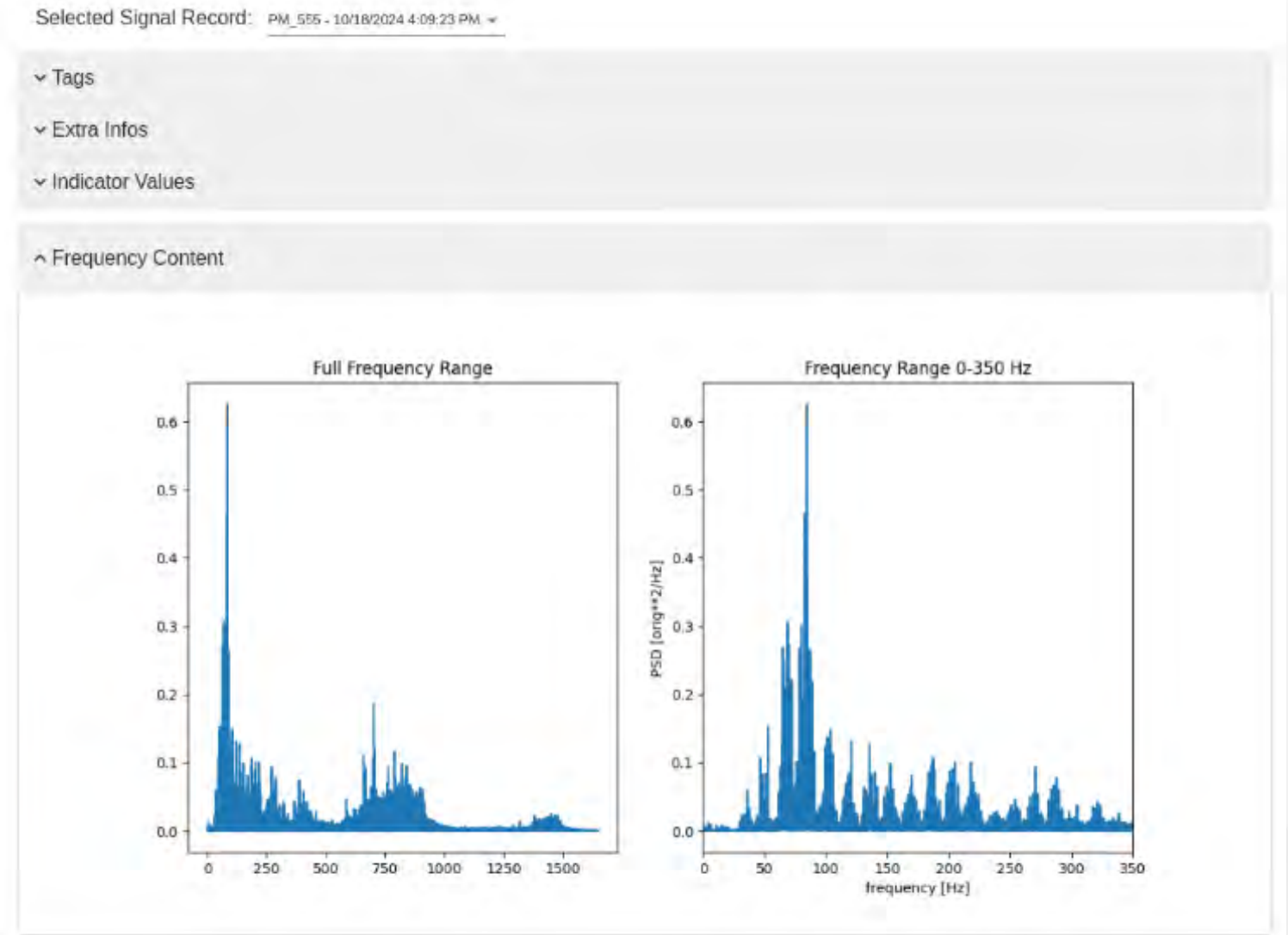
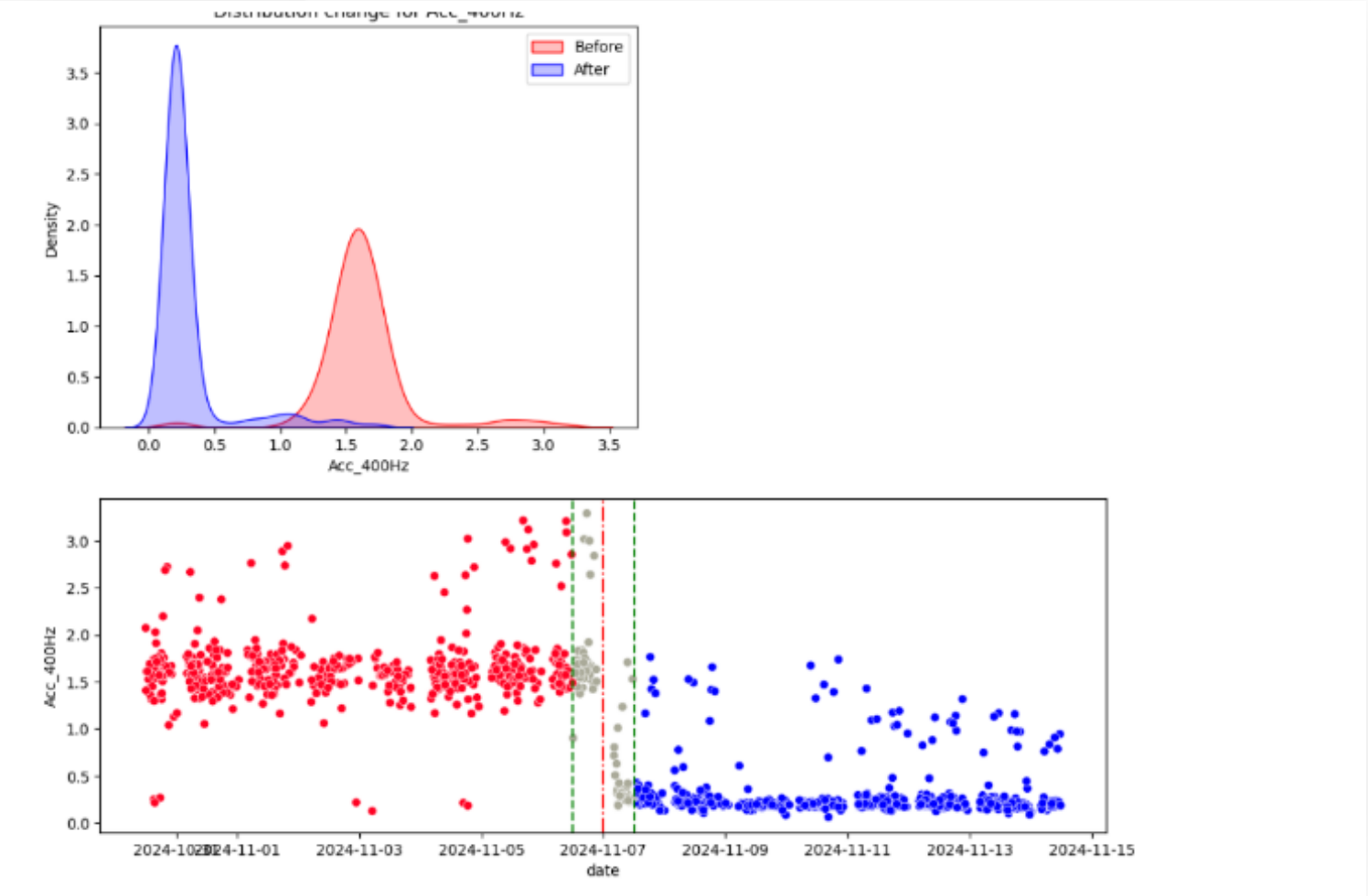
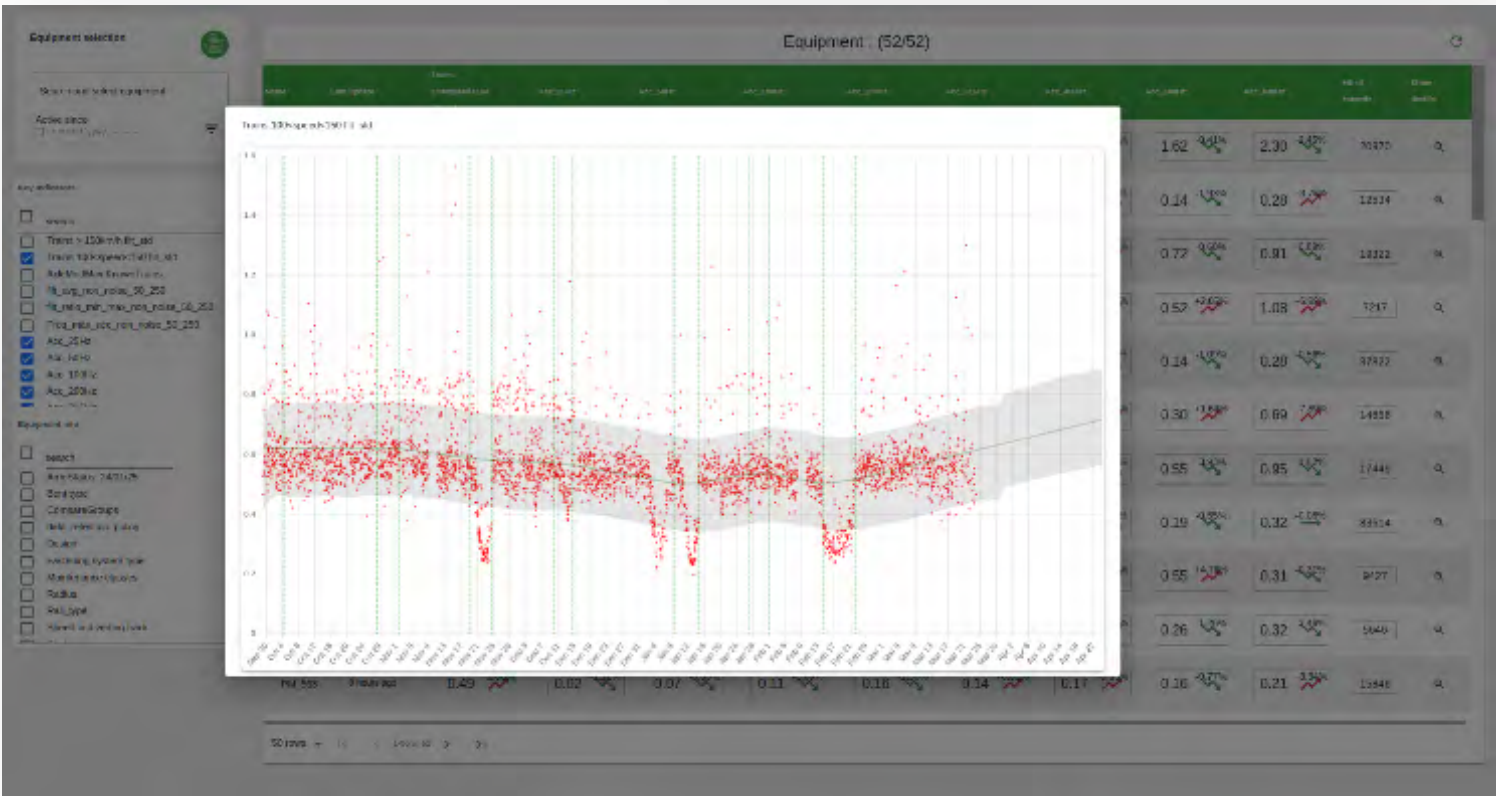
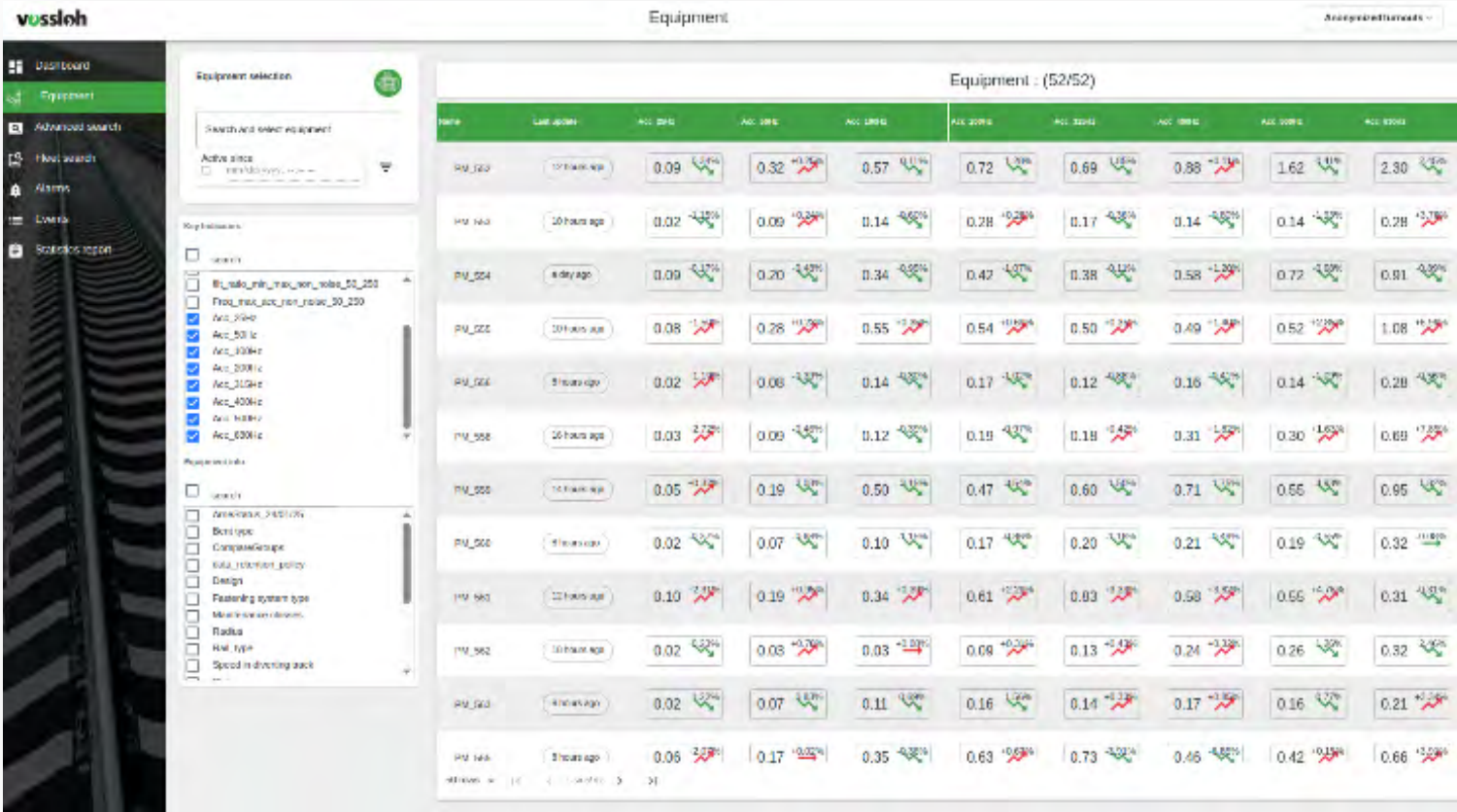
Data Lab

Advanced rail infrastructure data analysis software



Additional Features

- › Build actionable indicators
- › Improve your knowledge on the monitored system
- › Build trust in your monitoring tool
- › Simulate alarm settings
- › Analyse the impact of your maintenance
- › Create customized reports





TrackStability

Risk assessment for track misalignment and buckling, with data-driven recommendations



Problem description

Risk of track buckling and misalignment

Lateral sleeper displacement can lead to track misalignment or buckling. This creates safety risks and can disrupt traffic, and operators need a reliable way to know where the risk is greatest and what action to take.

Solution description

Validated risk assessment for track stability

TrackStability provides a validated risk assessment of track design in relation to lateral displacement. Users upload a track section and set global parameters on track design and condition, with the option to add more detail for individual points or smaller sections. Based on this data, the system calculates the critical temperature and speed limits needed to stay within the allowed limits of lateral sleeper displacement, and gives recommendations to further reduce risk, such as design changes, changes in condition, or operational adjustments.

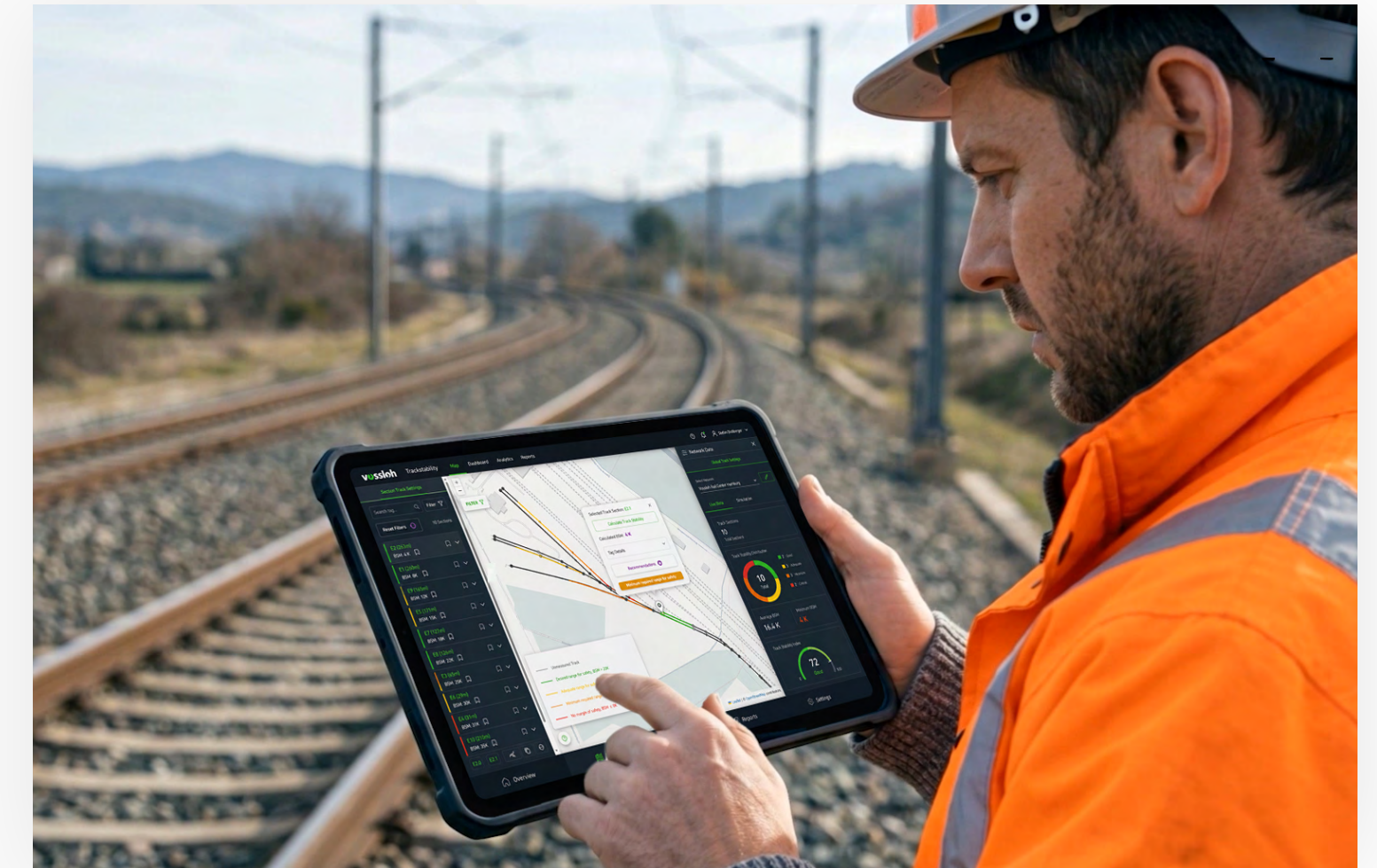
How it works

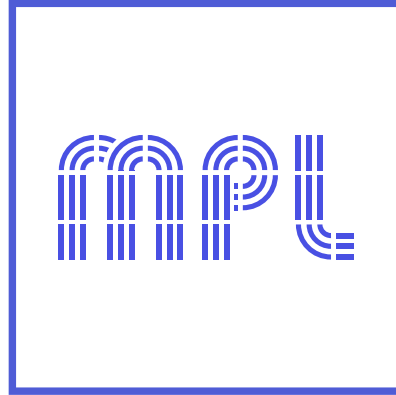
Main Features

- › Calculates the buckling safety margin of selected track points
- › Displays safety levels on a map using color coding
- › Proposes recommendations to improve lateral track stability (e.g. M-Generation, sleeper anchors, tamping, reduced train speed, rail whitening)

Additional features

- › Helps manage the risk of track misalignment or buckling and reduces traffic impact
- › Reduces stress on the infrastructure, extending asset life and lowering costs
- › Advises which actions to take to reduce buckling risk, increasing safety
- › Identifies the best product options to address critical hot spots





mapl-e

Rail condition and maintenance visualization app

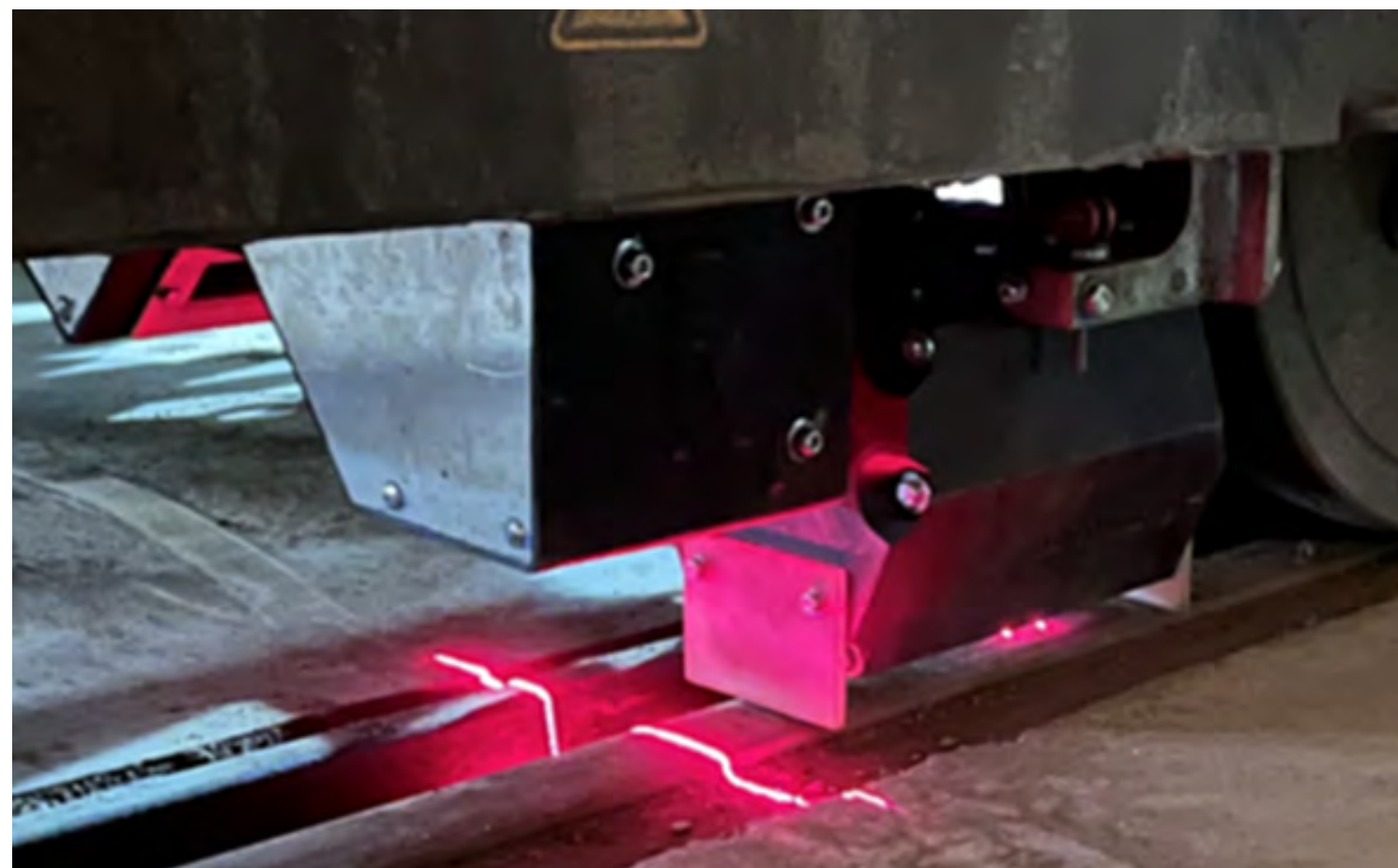
Problem description

Track availability requires considerable increases in efficiency in rail and switch maintenance.

Solution description

Laser-based rail condition measurement and maintenance

mapl-e is an innovative solution to efficiently improve your rail condition. It combines laser measurement and other technologies, as well as powerful data processing, to enable optimized maintenance while saving costs through combined grinding and measurement. It allows continuous data collection even during high-traffic periods, providing rapid access to valuable information. With mapl-e, you can make informed decisions and plan maintenance efficiently based on real-time data, all in one integrated platform.



How it works

Web-App on Vossloh connect

- › Powerful yet flexible data visualization & analysis
- › Several levels of information at every scale
- › Measurement event management
- › Rail maintenance simulation with machine and shift breakdown

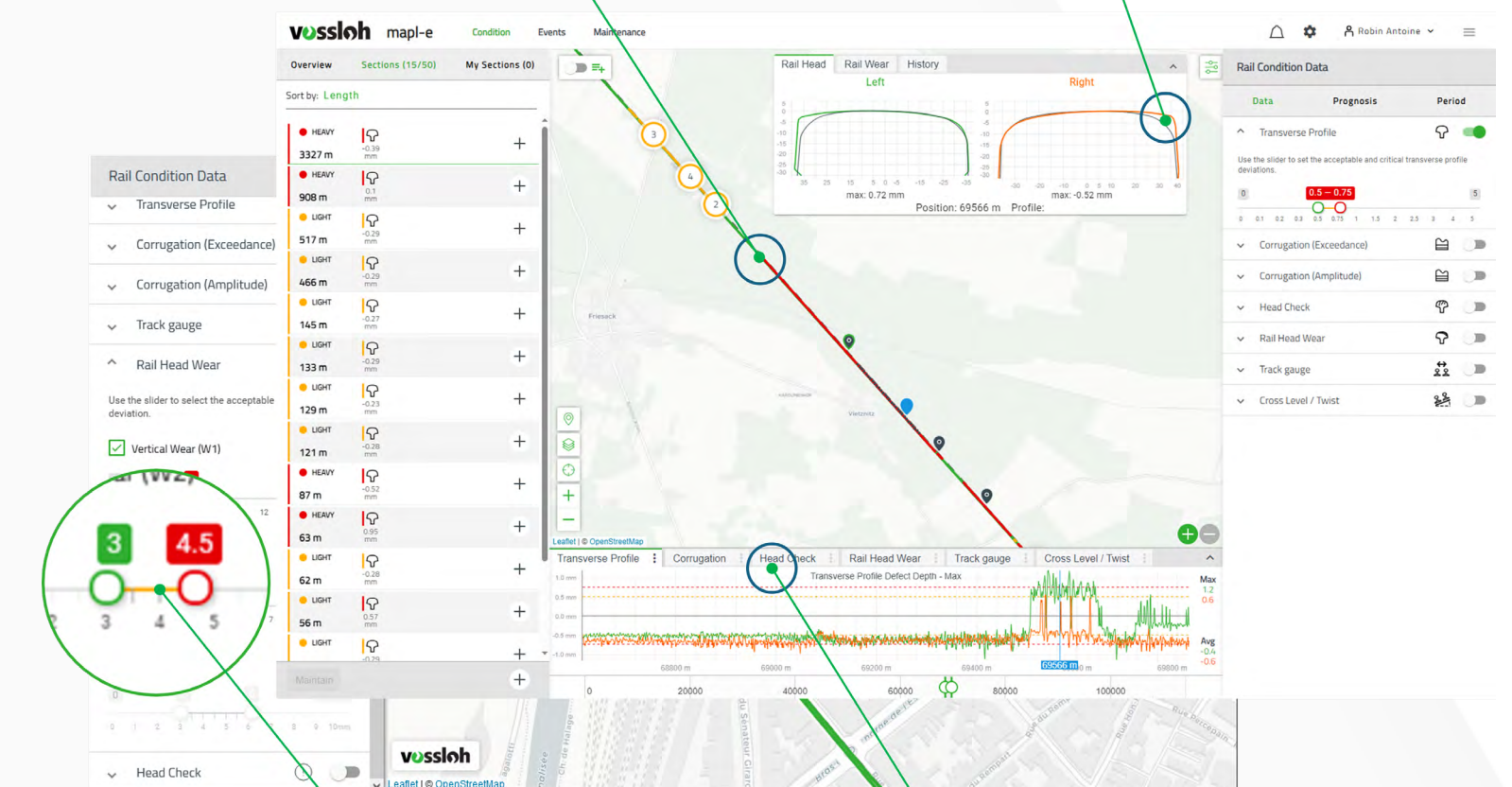
Laser Rail Scanning

Our Laser Rail Scanning is a non-contact optical rail and track measurement system, specifically designed for the yellow machines. The system enables high-speed measurement and real-time processing.



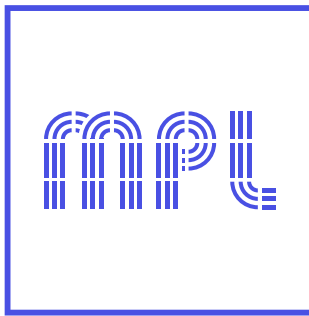
Color-coded visualization

Local data



Adjustable tolerance range

Section details plot



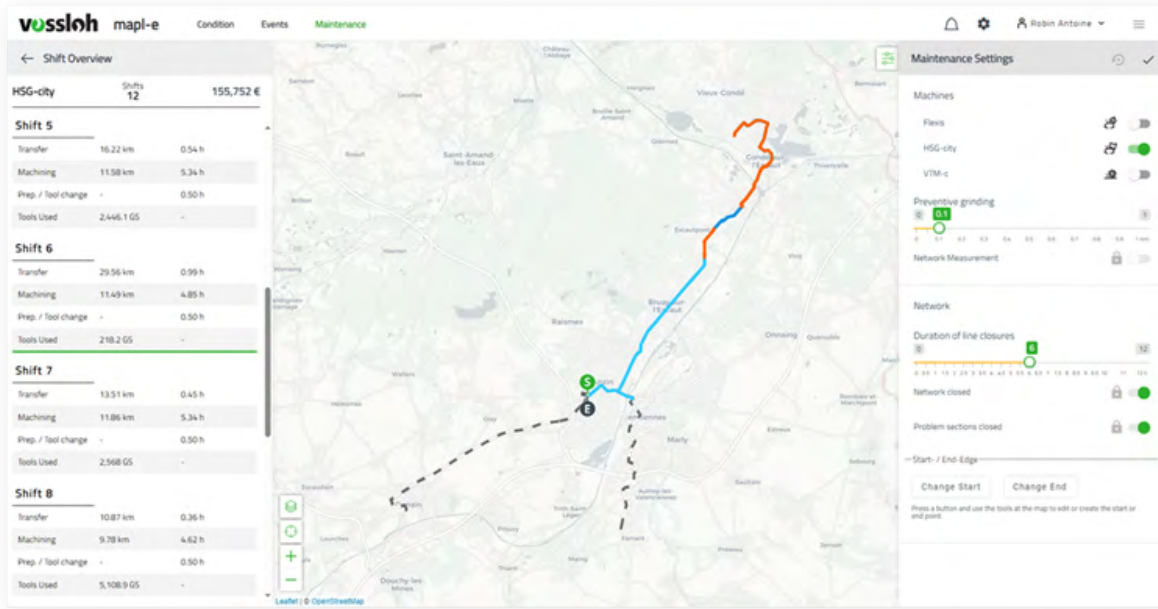
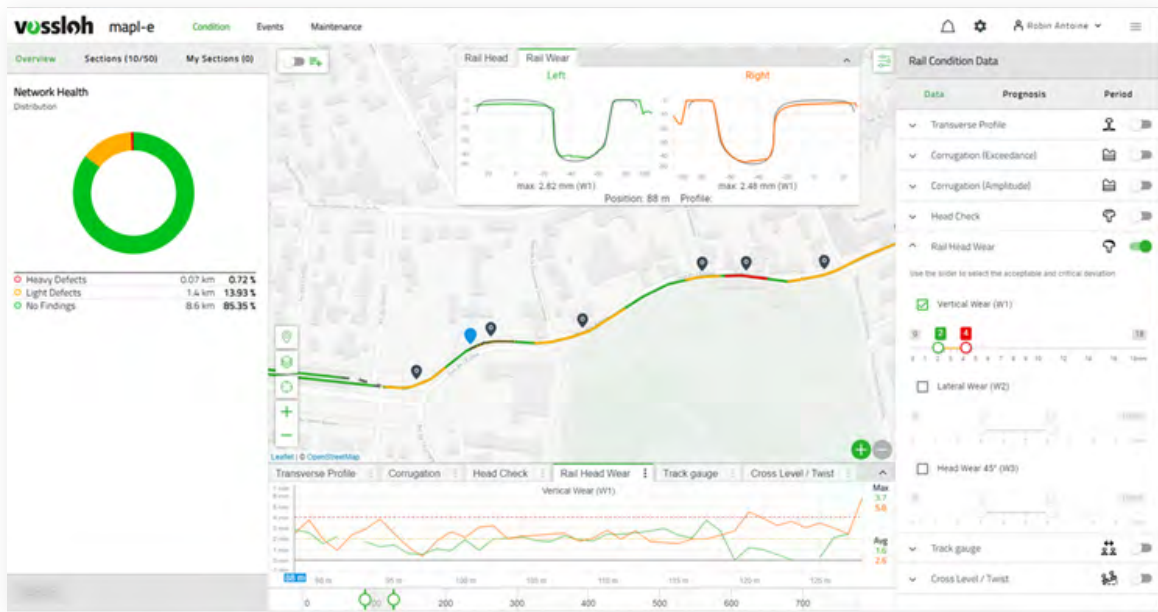
mapl-e

Rail condition and maintenance visualization app



Additional Features

- › Scanning/Measurement of the transverse profile (Rail head, Groove, Vertical & Lateral Wear and track Gauge) & Longitudinal profile for corrugation measurement
- › Measurement comparison, past evolution or prognosis of rail condition
- › Simulation of maintenance shifts with Vossloh’s machine pool
- › Easy data import thanks to track matching algorithm. Import in tunnels possible in the import assistant.



Laser Rail Scanning

High speed, non-contact rail & track geometry measurement system

Operating parameters	
Direction of operation	In both directions
Maximum speed	60 km/h
Rail type	Free-standing flange rails; recessed or free-standing grooved rails (optional); all track categories
Curve radii	≥ 25 m
Clearance gauge	Same as the maintenance machine
Ambient temperature	In operation: 0 °C to +40 °C Standby: -25 °C to +50 °C
Humidity	Max. 85 %
Altitude	< 2,000 m
Rain, storm, dust	Measurements taken during rainfall, storms or in dusty conditions may be interrupted or limited in scope
Snow	Snowfall or snow on the track can damage the optical measuring components

Specification	
Communication	WLAN, LTE (4G)
Localization	GPS/Galileo: Accurate to 5 m Position encoder: Accurate to ± 0.1 mm/m
Longitudinal profile sensor	1 measurement/mm: Accurate to ± 8 µm
Transverse profile sensor	1 measurement/mm: Rail head: Accurate to ± 0.1 mm Groove, groove rail head: Accurate to ± 0.3 mm Track gauge: Accurate to ± 1 mm
Software	Measuring software LRS-control LRS-insight

Other features	
1 operator for the measuring technology	
Wireless operation	



Vossloh Open Gateway

Smart gateway linking legacy railway equipment to digital monitoring networks



Problem description

Connecting legacy devices to modern systems

Many railway devices are legacy or non-networked, which makes it difficult to connect them to modern IIoT systems for monitoring and data transmission.

Solution description

A railway-rugged gateway for legacy devices

The Vossloh Open Gateway (VOG) is a railway-rugged gateway that connects legacy, non-networked railway devices to modern IIoT systems for monitoring and data transmission. It converts serial and analog data from signaling systems into MQTT/Sparkplug communication protocols. A DIN-rail-mounted backbone provides power and data to all modules. Thanks to its plug-and-play modules for acquisition, communication and edge computing, and support for hot-swapping acquisition modules, VOG can be placed in a trackside cabinet to connect existing field equipment, including non-networked devices, to modern data platforms with minimal effort.

How it works

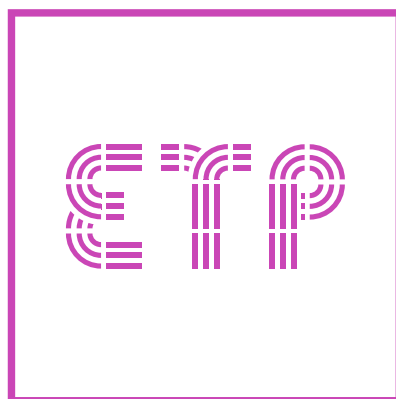
Main Features

- › Connects legacy, non-networked railway devices to modern IIoT systems

Additional features

- › Supports the digitalization of railway networks
- › Increases asset life and safety by enabling the use of collected data from VOG-connected monitoring solutions
- › Reduces costs through increased asset life and maintenance support from the connected monitoring solutions





EATEMP

Smart sensor for real-time rail temperature monitoring

Problem description

Monitoring rail temperature affordably

Rail operators need a fast and low-cost way to monitor rail temperature, since extreme temperatures can affect track safety and asset life.

Solution description

A battery-powered rail temperature sensor

EATEMP (Easy Temp) allows for a fast-to-install, low-cost monitoring solution for rail temperature. The battery-powered sensor is magnetically attached or rail-mounted and detects the current temperature of the rail.



How it works

Main Features

- › Constant delivery of rail temperature on a user-friendly dashboard
- › User-defined alarm thresholds to warn of extreme temperature conditions

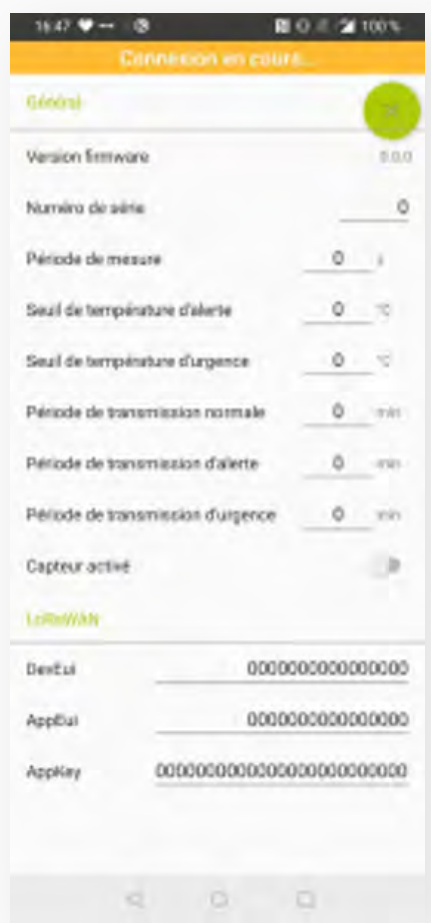
Additional features

- › Extends asset lifespan by allowing train speed to be reduced to recommended levels during high temperatures
- › Optimizes maintenance through improved prioritization and planning
- › Reduces overall costs through timely prevention and extended asset life
- › Increases safety, as train speeds can be adjusted to recommended levels during heat periods
- › User-defined alarm thresholds can be configured with mobile application



Specification

Dimensions	160 × 75 × 55 mm (L/W/H)
Weight	0.75 kg
Operating temperature	-10°C to +70°C
Protection rating	IP66
Battery life	3 years with 72 readings per day
Ergonomics	Easy to transport and install (magnetically attached to the rail web)
Use	Monitoring temperature changes over time
Accessories	Reader sensor enabling direct temperature measurement
Communication	LTE-M / LoRaWAN





EaFLEX

Intelligent sensor tracking rail movement to enable predictive maintenance

Problem description

Detecting track deflection early

Rail operators need a reliable way to detect track deflection and movement, especially during train passages, to plan maintenance before problems escalate.

Solution description

A rail-mounted sensor for track movement

EaFLEX (Easy Flex) is a battery-powered, rail-mounted sensor that monitors track deflection and movement, especially during train passages, tracking motion across axes. It provides insights into the condition of the rail network, enabling predictive maintenance and, if needed, speed restrictions in certain areas. It is a versatile, adaptable solution that can be integrated into any railway environment to meet specific or evolving project needs.



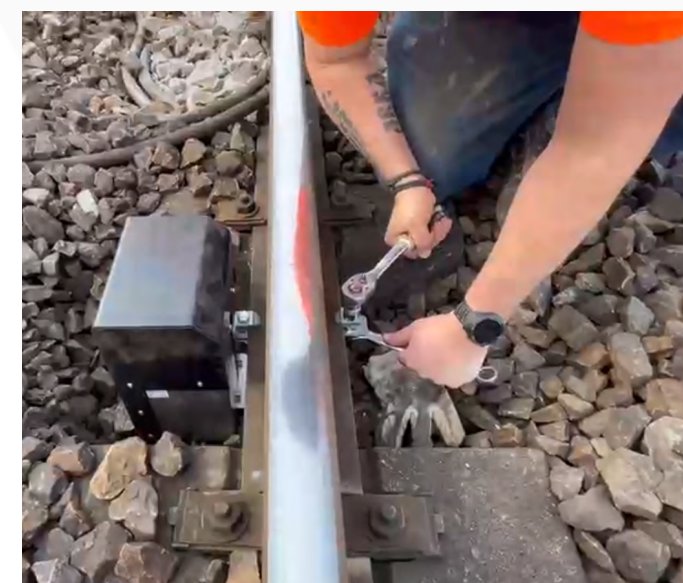
How it works

Main Features

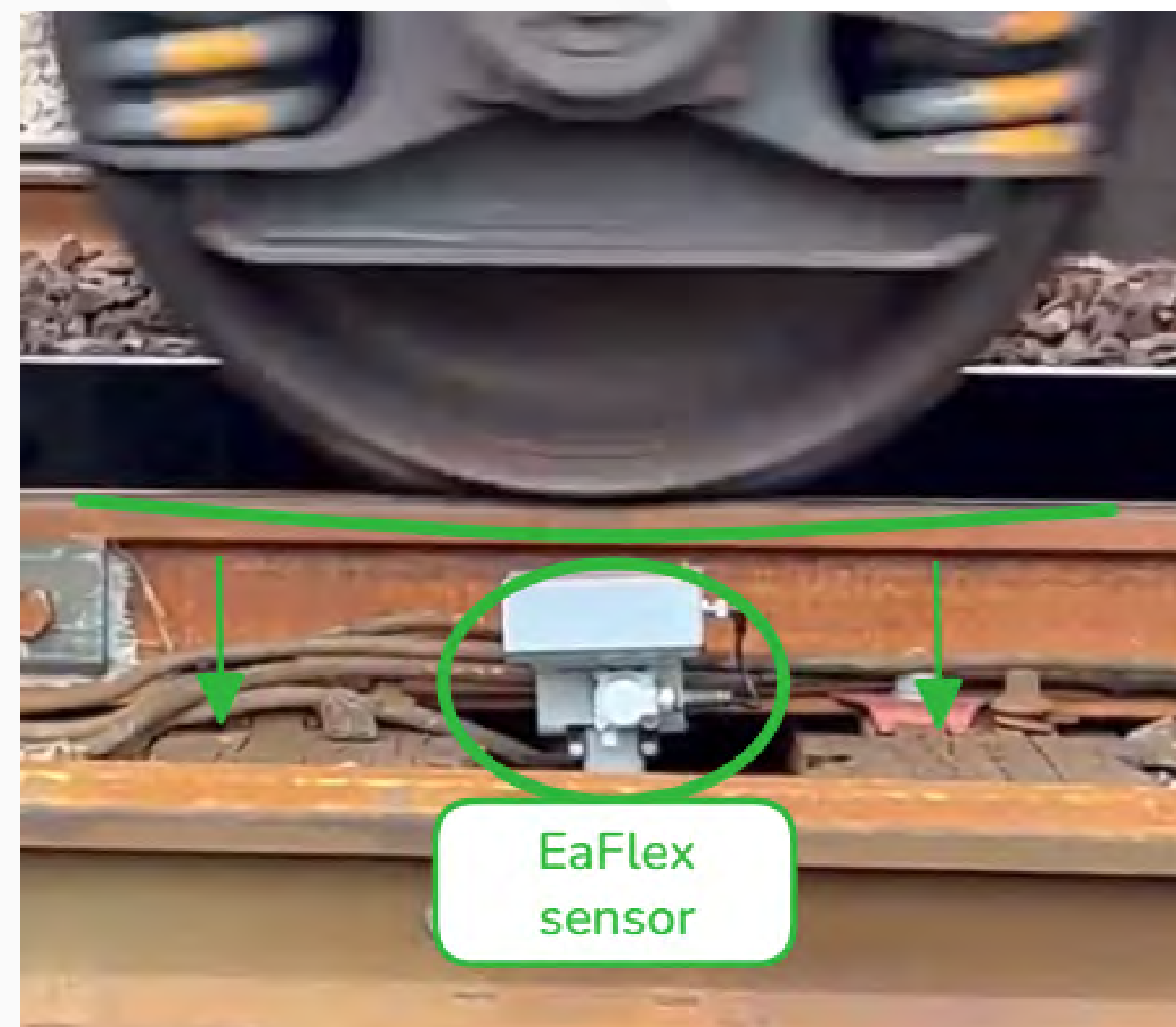
- › Records track movement and deflection data across three axes
- › Sets alarms if defined thresholds are exceeded

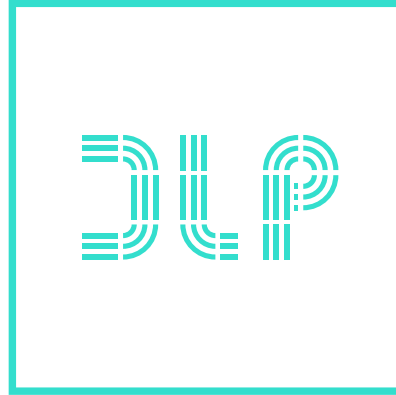
Additional features

- › Supports maintenance by monitoring track sections and locating hotspots
- › Checks the effectiveness of maintenance work by comparing data before and after
- › Reduces downtime and increases availability through early intervention
- › Optimizes maintenance through improved prioritization and planning
- › Reduces overall costs through timely prevention and extended asset life
- › Increases safety by enforcing speed restrictions where needed



Specification	
Dimensions	370 × 160 × 390 mm (L/W/H)
Weight	3.9 kg
Protection rating	IP65
Ergonomics	Quick installation directly on the rail foot
Power supply	Lithium battery
Communication	LTE-M / LoRaWAN





Digital Logistics Planner

Gamification for higher track availability

Problem description

Use digital technology to optimise planning, logistics and cooperation in switch replacement projects.

Maintenance projects in areas with intense traffic or urban environments often present several challenges:

- › **Disruption to train operations:** Installing new turnouts requires closures or significant interruptions to railway operations.
- › **Complex engineering:** Projects like this require a high level of expertise. Short preparation time can lead to budget overruns and unexpected disruptions.
- › **Sensitive logistics:** Vehicles are often moved unnecessarily or trapped during track removal. Also, lifting large turnouts can be a risk to other installations.
- › **Safety risks:** Installing turnouts can expose workers to risk. Proper safety measures must be put in place.

Solution description

A web application (Unreal Engine) allows a detailed simulation of the planned maintenance project.

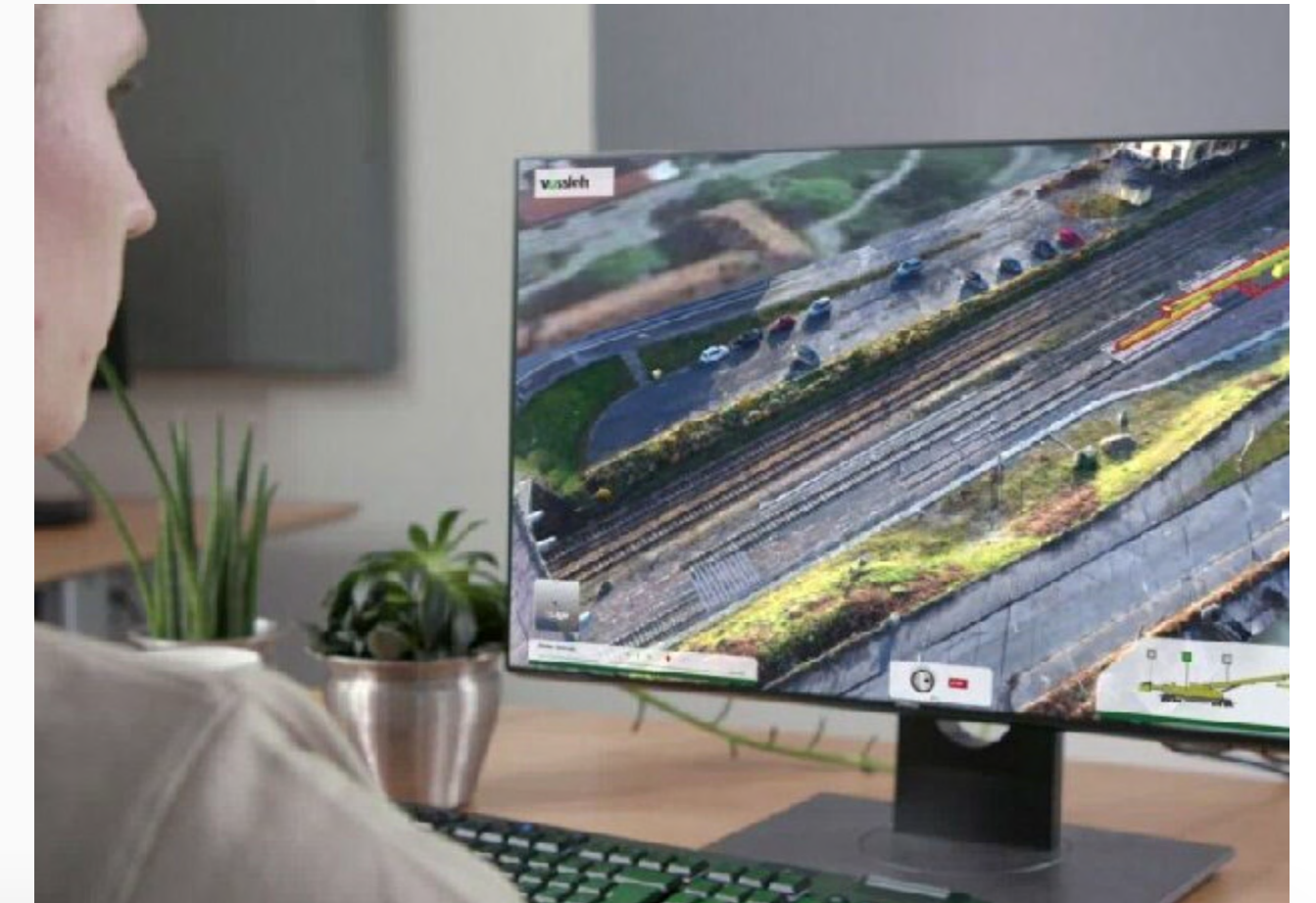
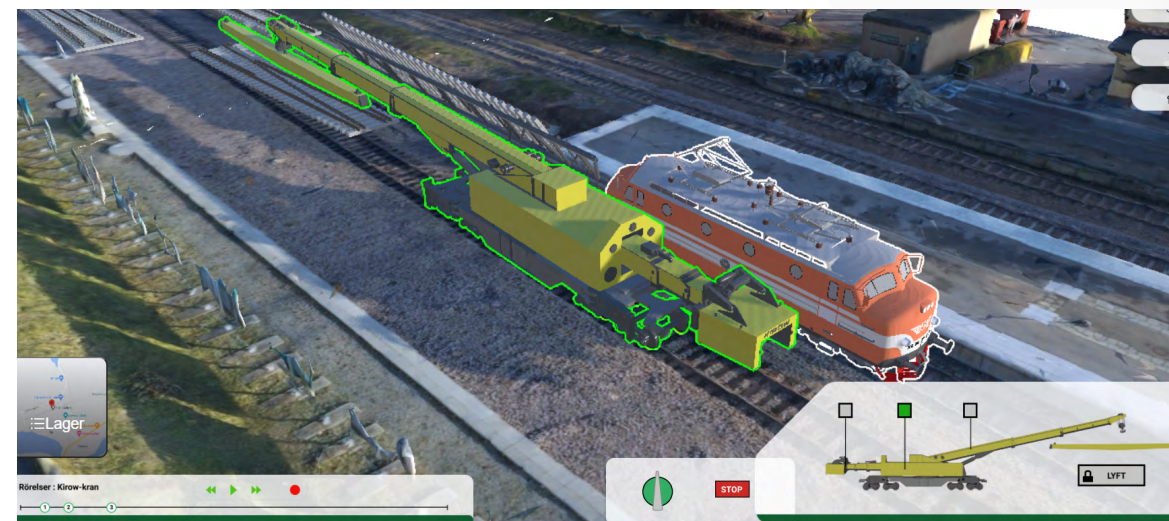
- › Unreal gaming platform used for visualisation of planned projects.
- › Backend connection to customer data sources.
- › Combining input from track layout, satellite photo and point cloud/photo geometry.
- › Trains, turnout modules and lifting equipment/Kirow-cranes are imported from BIM-models.

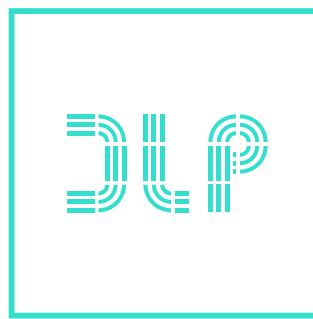
- › Different scenarios can be animated to evaluate train movements and lift operations.
- › Also possible to show storage areas for turnout modules.

Higher efficiency in track work

More turnouts installed in less time

- › Reduced traffic downtime with shorter track closures
- › Improved efficiency and collaboration
- › Improved safety
- › Improved logistics
- › Improved risk management





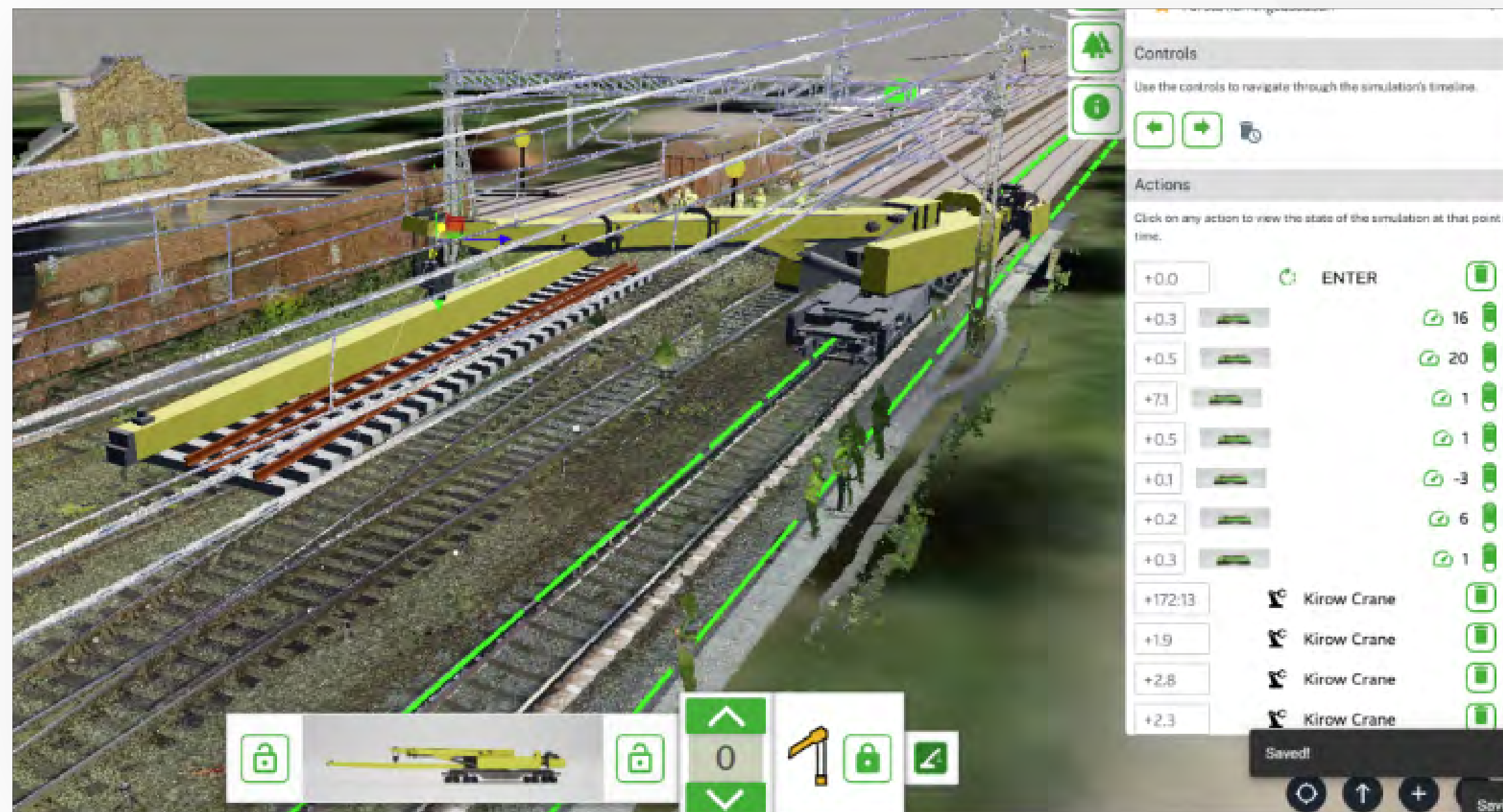
Digital Logistics Planner

Gamification for higher track availability



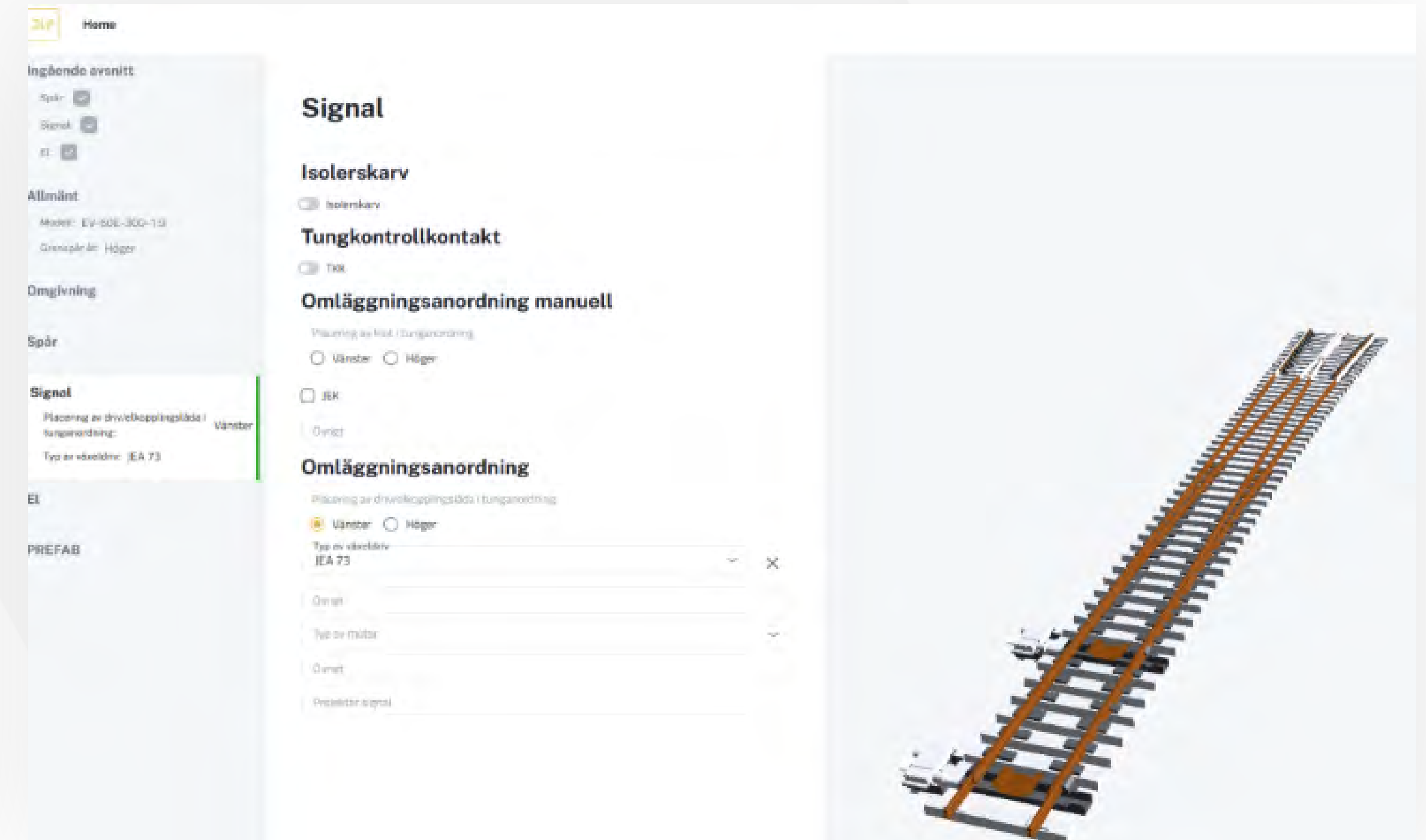
Additional Features

- › The solution can use any source with sufficient information of the surroundings. It can be a point cloud, a BIM model, etc.
- › If no source is available, a site scan can ensure the appropriate rendering of the track and various elements around that will impact operations: poles, assets, cabinets, fences...
- › Web application with cloud platform, accessible from any device
- › Direct import of native Laser Rail Scanning (LRS) files



Additional Highlights

- › Easy to use
- › Visualises procedure to non-specialists
- › Significantly reduces risks in planning





OSI-Shunt

Plug-and-play track occupancy simulation and controlled shunting

Problem description

Simulating track occupancy safely

Long-term worksites need a safe way to simulate track occupancy or perform a controlled shunt without installing equipment every night.

Solution description

A temporary connected device between the rails

OSI-Shunt is a temporary connected device installed between the rails to simulate track occupancy or perform a controlled shunt. It integrates telemetry, remote control and safety interlocks. It is installed in under five minutes with plug-and-play simplicity, reducing the risk of track incidents and derailments while cutting operational time, as it only needs to be installed once per work phase rather than every night.

How it works

Main Features

- › Simulates track occupancy with a remotely activated device
- › Only needs to be installed once and creates a shunt between rails when activated

Additional features

- › Used on long-term worksites to simulate track occupancy and ensure safety for workers on site.





EAPark

Real-time track occupancy monitoring for smarter track and depot management



Problem description

No clear overview of track movements and space usage

Operators often lack a holistic overview of vehicle movements on track, making it hard to manage lane and garage space efficiently based on real occupancy.

Solution description

Combining multiple sensors for one holistic overview

EAPark combines multiple sensor solutions to provide a holistic overview of movements on track, allowing track and depot management to be optimized based on real occupancy.



How it works

Main Features

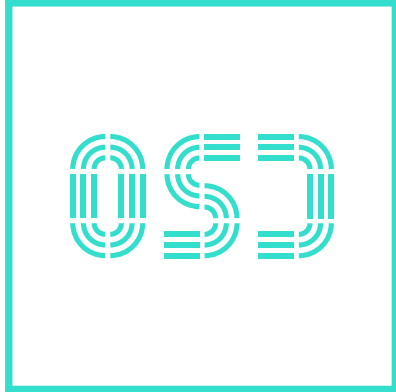
- › EASwitch Position sensor
- › EAPN axle counter device
- › Derailer position sensor

Additional features

- › Improved space utilization: real-time occupancy detection allows better management of available parking capacity, reducing unused or inefficiently allocated spaces
- › Operational efficiency: automatic movement analysis streamlines day-to-day management of parking and garage areas, reducing the need for manual checks
- › Data-driven decision making: continuous occupancy data supports better planning of capacity and future infrastructure needs



Specification	
System composition	- Railway switch monitoring - Axle-counting monitoring - Derailer position monitoring
Dimensions	- Switch position sensor: 460 × 340 × 100 mm (L/W/H) - Axle counting sensor: 265 × 140 × 90 mm (L/W/H) - Derailer position sensor: 70 × 70 × 40 mm (L/W/H)
Weight	- Switch position: 5.5 kg - Axle counter: 2.4 kg - Derailer position: 0.3 kg
Ergonomics	Non-intrusive to the track; magnetic or clamp mounting
Use	Complete solution for the rear base
Data visualization	Web platform: dashboard, processed data Field: TIP display unit, tablet, and connected watch
Upgrade option	Rechargeable battery version



OSI-Detonator

Automated train warning system for trackside worksites



Problem description

Warning workers if a train enters an unauthorized worksite

On long-term worksites, workers need a reliable way to be warned if a train enters the section without authorization.

Solution description

Trackside device with audible alert

The connected SAM detonator (OSI-Detonator) is a smart trackside device that indicates on-site activities using a day flag and night LEDs, and triggers an audible alert if a train fails to stop. It is remotely controlled and reports real-time information to the operations center. It is installed in under five minutes, once per work phase.



How it works

Main Features

- › Red flag during the day and LED at night to signal trackwork on the section ahead
- › Detonation charge to alert workers if a train enters the unauthorized area
- › Remotely activatable



Additional features

- › Supports safety on long-term working sites

Specification	
Dimensions	400 × 120 × 250 mm (L/W/H)
Weight	4.9 kg
Protection rating	IP65
Operating temperature	-10°C to +70°C
Installation	Adapts to different rail-head heights (U33, U50 and U60). Installation time: 2 to 3 minutes
Power supply	Internal battery (1 day of operation) + external battery (approx. 30 days)
Accessories	Carrying case



OSI-Switch Position

Plug-and-play switch monitoring with LED malfunction alerts



Problem description

Detecting switch malfunctions early

Point machine malfunctions on switches can be difficult to detect quickly, increasing the risk of track incidents, derailments and trailing accidents.

Solution description

Smart sensors monitoring switch position

Smart sensors continuously monitor switch position and are compatible with all sleeper types. They detect point machine malfunctions and give a visual warning via red LEDs on the sensor in case of malfunction. The system is installed in under five minutes with plug-and-play simplicity, reducing the risk of track incidents and derailments while saving operational time, as it only needs to be installed once per work phase rather than every night. The Anti Trailing System version adds a master sensor, identical to the standard sensor, together with a slave sensor, which can be installed either to track the train route or to protect a turnout.



How it works

Main Features

- › Detects the position of the turnout and responds by deploying or retracting safety devices
- › LED status indicator
- › Event logging
- › Master and slave sensor setup for trailing protection (Anti Trailing System version)



Additional features

- › Maintenance support on switches
- › Cost saving, as maintenance is only done when needed
- › Increased availability, as failures are detected and predicted early
- › Increased safety on worksites, including prevention of trailing accidents

Specification	
Dimensions	460 × 340 × 100 mm (L/W/H)
Weight	5.5 kg
Operating temperature	-10°C to +70°C
Protection rating	IP66
Installation	Wooden sleeper: Fastened to the sleeper with screws Concrete sleeper: Clamped to the sleeper
Use	Monitoring railway switch
Data visualization	Web platform: dashboard, processed data Field: TIP display unit, tablet, and connected watch
Upgrade option	Rechargeable battery version Visual alert in case of switch malfunction



EATracker

Real-time equipment tracking to prevent loss on worksites



Problem description

Losing track of worksite equipment

On worksites, it can be difficult to keep an overview of where equipment is located, which increases the risk of losing it. Monitoring the position and condition of catenary poles during installation projects is also a challenge.

Solution description

GPS and sensor-based tracking for worksite equipment

EATracker is a sensor designed to track equipment and tools on worksites, giving an overview of the actual equipment location and reducing the risk of losing it. The EATracker Catenary is a pole-mounted version, specifically developed to monitor the movement of catenary poles. By combining pressure, GPS and accelerometer data, it provides reliable data that can be used to monitor installation projects.

How it works

Main Features

- › GPS localization of work equipment
- › Condition monitoring of catenary poles, delivering insights into location, operating status and grid quality
- › For EATracker Catenary: automatic alerts if thresholds are exceeded

Hardware

- › The EATracker Catenary is a pole-mounted sensor combining pressure, GPS and accelerometer data.



Specification	
Dimensions	210 × 75 × 90 mm (L/W/H)
Weight	0.6 kg
Protection rating	IP65
Ergonomics	Form adapted to the equipment; quick installation
Power supply	Lithium battery pack
Accessories	USB-C charger
Geolocation accuracy	± 1 m
Battery life	6 months