

CASE STUDY

CableGuardian
proven Tier 1
monitoring
technology

5+
YEARS

£5M

Saved in Penalty Payments

30K

Avoided Delay Minutes

£150K

Saved in Maintenance Costs

CABLEGUARDIAN

ASSET MANAGEMENT COLLABORATION

NETWORK RAIL WALES AND WESTERN REGION



CableGuardian is the only product to offer proactive monitoring, detection and location of both insulator and conductor faults on live signalling power systems as specified in Network Rail specification NR/L2/SIGELP/27725. - Insulation Monitoring and Fault Location Systems for use on Signalling Power Systems.



Tier 3 Approved



Tier 2 Approved



Tier 1 Approved

Proven Trackside Technology Since 2018: This advanced system has been proven in operation since August 2018, with multiple UK regions already benefitting from the technology and further installations scheduled across the network this year.

Key Benefits:

- Fewer boots on ballast fault finding and cable testing.
- Reduced number of service-affecting failures.
- Quickly and accurately locate cable faults and cable theft.
- User friendly web portal for fault diagnosis location.
- Allows trending of insulation resistance and insulation capacitance at a cable section level.
- Technological alternative to the five-yearly manual cable testing requirements.

CableGuardian helping passengers to arrive on time.

CASE STUDY

AGILE COLLABORATION FOR EFFECTIVE ASSET MANAGEMENT OF SIGNALLING POWER SUPPLIES – VIPER INNOVATIONS AND NETWORK RAIL WALES AND WESTERN REGION

Viper Innovations CableGuardian is really becoming the go-to technology for the effective management of this most critical asset - signalling power supplies. Wales and Western Region Maintenance Engineers and Asset Managers have put in place an innovative and forward-thinking strategy using CableGuardian to drive up proactive asset management concerning the 650V network and have worked over a number of years to help mould the technology and service to get precisely what they need to make lasting changes to working practices.

Network Rail's plan for CP7 is to increase collaboration to drive up safety, performance, efficiency and asset sustainability and make more from digital technology - and to this end, Viper Innovations have been working hard behind the scenes with our partners in the Region to put the foundations in place for real change in the performance, maintenance and asset management of Signalling Power Supplies.

Technology Selection

Western Route identified the need to improve how they managed the signalling power supply asset to meet the needs of the business moving forward, and this led them to trial the whole range of technology available for signalling power supply monitoring, maintenance and asset management. They conducted several trials and made a direct comparison of a range of technologies and methodologies to achieve their aims and settled on CableGuardian as the best choice for fixed infrastructure monitoring.

They found that the Viper Innovations system for monitoring the 650V network provided a much fuller range of parameters, gave higher accuracy and measured to much higher levels - providing the ability to identify issues and detect patterns of failure well before they happened. The ability to measure insulation resistance, insulation capacitance, voltage, current, volt drop, and the inclusion of Spread Spectrum Time Domain Reflectometry (SSTDR) to accurately pinpoint cable, switchgear and transformer defects and failures provided all the parameters needed to be able to move to risk-based maintenance and avoid the need to perform cyclic periodic maintenance. It also provided previously unseen levels of insight into the asset to enable a complete change in the asset management process for coming control periods.



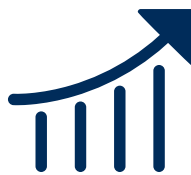
CableGuardian System Installation,
Network Rail, Wales and Western

CASE STUDY

Safety

The number one issue for everyone on the railway is safety - of both the travelling public and staff working trackside. Maintenance practice prior to CableGuardian was done manually, with the entire signalling power system having to be broken down and invasively tested on a five-yearly basis. This exposed staff to the ever-present risks associated with travelling to and from site, plus the issue of having to work unsociable hours under pressure on 650V electrical systems. Also, a significant outage of the system inevitably means serious perturbation to train services, disrupting traffic and leaving operations staff attending site, passengers being de-trained (potentially in locations unsuitable for a large influx of people) and being placed on buses. This type of activity won't be acceptable on the future railway, and the teams on Wales and Western have worked hard to prove there is a technological alternative.

Using evidence gained from interventions based on CableGuardian and subsequent actions taken, the delivery unit teams in Western have created a closed-loop process for asset management, affording evidence-based, targeted and controlled interventions that move 650V maintenance into the future. This has led to a Temporary Variation to standards being agreed to stop performing invasive maintenance. With the evidence and experience developed, changes have been put forward to the SIGELP 50000 suite of standards.



Performance and Reliability

The starting point for any train service is punctuality, and a failure of signalling power supplies is catastrophic in nearly all situations. Before the advent of CableGuardian, there was only so much that could be done to prevent failures of lineside cabling, switchgear and transformers, but Wales and Western found through their trials with the technology and the moulding of the required service from Viper, that the asset could be viewed in-depth on a continuous basis, providing learning and insight into the system that has never before been seen. For example, Engineers were able to identify and pinpoint latent defects in cable joints in new cables on the main line and intervene to prevent these from becoming a failure. They have been able to identify individual sections of cables that were bringing whole systems down and isolate and repair them prior to an incident, together saving multiple extreme service affecting failures.



NETWORK RAIL COMMENTED:

"The CableGuardian units we have installed so far are already proving their worth and have helped to proactively identify system issues before they become service affecting. The system's capability has allowed us to amend our maintenance practices and, in the future, once fully deployed, fundamentally change the way that we manage and renew our 650V lineside power assets."

Phil Stanley Regional Asset Manager (Fixed Plant)



CASE STUDY

Efficiency

Not only did the team find that they could pinpoint potential issues and act to prevent defects from creating failures, but they could also do so extremely efficiently, even with basic system layouts. The forward-thinking view of Delivery Unit Engineers and subsequent teamwork with Viper set up several interventions where engineers used a minimum viable product (MVP) approach by installing a fixed Tier 2 arrangement (one CableGuardian unit monitoring a whole feeder) to narrow down the location of a failing cable and then used a 'roaming unit' to chase the failure down within the feeder. In an ideal scenario, this would have used a Tier 1 arrangement (CableGuardian units spaced down the length of the feeder) to detect this automatically, but, in this instance, available funding called for a lower cost option, and the team innovated to produce effective results. What is the result of this agile approach to maintenance delivery? A potentially significant service affecting failure affecting the intersection of two busy routes into London was avoided, and a minimum-cost solution was applied.

Asset Sustainability

In the work done to date, the collaboration with Wales and Western and Viper has delivered impressive results. Multiple service affecting failures avoided - significantly improving safety, driving up performance, saving tens of thousands of delay minutes, millions in penalty payments and hundreds of thousands in operational and maintenance expenditure on failure recovery. Maintenance practices brought into the modern age - with remote monitoring underpinning a safe, effective and considered closed-loop process for intervention and standards changes underway to deliver the national platform to modernise maintenance. However, one of the most significant changes will come with the ability to move from large-scale asset renewals to pinpointed interventions based on demonstrably detailed and accurate asset condition assessments.

The depth and breadth of monitored parameters from CableGuardian, alongside the collaboration between Network Rail and Viper to understand the data being presented, has created a system that will enable asset engineers to drive every associated KPI to new levels, with the added bonus of wholesale changes to asset management of signalling power supplies. The ability to monitor and predict the lifecycle of individual components of the 650V network will enable targeted renewal of specific system items and accurate planning of multiple control periods into the future. This will reduce renewal costs by millions across just one route, so the scaling-up potential is huge.



CASE STUDY

Future Potential

The current position of Wales and Western Region's Signalling Power Systems has never been in better hands - but there is still much more to come from this collaboration. Together we have intervened on multiple potential service-affecting failures with all the stated benefits this brings. Still, Viper Innovations have only just started to scratch the surface of the potential of CableGuardian and the continued collaboration between technology suppliers and informed users.

A small number of potential defects in the system have been classified, which will be turned into alarms and events in due course, but we are seeing the potential for so much more. This includes identifying the loss of an earth rod connection and preventing a significant safety issue (SIN119). CableGuardian has detected latent cable and joint defects; switchgear failures; lightning strikes; loose, high resistance and overheating connections; cable damage and breaks; burned fuses; overloaded circuits - the list goes on.

We can detect cable theft and damage within a few metres and identify rapid changes in insulation resistance to enable mobilisation to prevent failure. There is the potential to determine the effects of weather and general moisture on cables and switchgear, enabling maintenance teams to identify the most appropriate course of action and save vast amounts of abortive time spent chasing failures. Understanding the issues of capacitance in the system is essential, and we will be working to develop appropriate actions based on changes to improve safety management. Therefore, CableGuardian can be used as a reliable, cost-efficient solution to help deliver the Reliability, Availability, Maintainability, and Safety (RAMS) requirements for high category track for project delivery.

The next steps will be to work together to provide the necessary understanding of all parameters, with the potential to identify the cause of Cat B Signal Passed at Danger (SPaDS), for example, and to properly assess and predict asset condition and time-to-live for each component in the system. We will extract even more from SSTDR, in terms of the ability to detect latent defects and changes in the system to predict failure and interference. Viper Innovations also have an eye on the future of being able to specify the best layouts, cable and switchgear types to suit the railway and changing environment.

Conclusion

This collaboration has exemplified how to develop, introduce and use technology to best extract business improvement, with so much more to come. The investment in time and technology from both Viper Innovations and Network Rail will surpass the excellent results already banked and eventually benefit the whole UK railway and beyond. It serves to create an export market that will increase the business case even further for UK PLC.

So, if this has interested you and you want to learn more, please get in touch with Viper Innovations or Network Rail Wales and Western Region for a conversation on how we can work together to move signalling power supplies into the modern age.





Get in touch with one of our experts today and learn what
CableGuardian could do for you:

www.viperinnovations.com/cableguardian

or contact one of our experts on:

enquiries@viperinnovations.com

www.viperinnovations.com