

Viper Innovations

The End of Blanket Renewals? How a Data-Driven Approach Is Transforming Rail Maintenance

Blanket renewals, which involve replacing entire systems based on age or estimated lifespan rather than specific non-functioning components, are the usual approach for maintaining safe railway operations.

However, blanket renewals fall short in terms of value for money and sustainability and for minimising service disruption, all of which are critical to meeting Network Rail's CP7 KPIs.

Condition-based spot replacements offer a new solution. Identifying which trackside parts, such as cables or transformers, to be switched reduces costs and limits operational disruption while maintaining safety and maximising efficiency.

The Downsides of Traditional Renewal Methods

In addition to the challenges already highlighted, traditional renewals are often:

- An inefficient use of human resources: a larger project team is required to replace entire systems
- Logistically complex: executing wholesale signalling power renewals leads to complex logistical challenges, such as widescale track closures and the need to commission specialised machinery
- A missed opportunity for rail asset managers to gather and benefit from real-time, data-driven insights

By contrast, spot renewals are resource and cost-efficient and improve safety and efficiency. A system

like Viper Innovations' CableGuardian facilitates spot renewal.

Spot Renewals with CableGuardian

CableGuardian enables targeted replacement through advanced diagnostics that proactively monitor degradation over time. It provides early warning of graceful decline and detects sudden faults in live signalling power systems. It integrates insulation resistance (core-to-earth) measurement and spread spectrum time domain reflectometry (SSTDR) (core-to-core fault detection).

By pinpointing specific assets that require attention, CableGuardian ensures minimal intervention using a tiered approach – Tier 2 for feeder-level insights and Tier 1 for more detailed insights into individual cables and trackside equipment housings or groups of equipment along a feeder. This allows rail engineers to target critical components effectively, improving safety, value for money, sustainability and reducing service disruption.

Rail asset managers can be more proactive around maintenance while leveraging real-time data to improve cost efficiency and reliability.

CableGuardian by Viper Innovations



CableGuardian in the Field: Cost Savings on the Western Route

The Western Route faced repeated issues around the Yatton area. Rail asset managers initially considered a complete cable replacement. However, CableGuardian's precise assessment showed that the faults were isolated to specific system sections. This meant that repairs need only focus on affected parts, avoiding the cost and disruption of a complete renewal.

CableGuardian's continuous monitoring predicted and prevented issues early, saving costs over the system's lifecycle. The temporary deployment option allowed for informed decisions without a full upfront investment, supporting budget-friendly decision-making.

The successful implementation at Yatton demonstrated how targeted renewals, backed by accurate diagnostics, can replace costly blanket renewals.

How to implement condition-based spot replacement with CableGuardian

Implementing condition-based spot replacement with CableGuardian is simple and can often be planned during less disruptive times, minimising operational impact. The implementation process is as follows:

1. Install CableGuardian

Deploy and non-intrusively connect the system without needing to shut down the 650V power supply, ensuring minimal disruption.

2. Monitor in real-time

CableGuardian offers continuous, real-time monitoring with advanced diagnostics that use insulation resistance measurement and SSTDR to locate faults in signalling power systems.

3. Target repairs

Use insights from CableGuardian to plan and execute targeted interventions at different levels, including Tier 1 and Tier 2 condition-based assessments.

Budget limitations and caution may mean that rail asset managers want to deploy new systems temporarily for condition-based maintenance before committing to full-scale deployment. Viper Innovations

offers a consultation option to address this concern, helping rail asset managers assess the feasibility and potential benefits of CableGuardian in a real-world setting.

Unlike some alternative systems, CableGuardian provides reliable fault detection and accurate diagnostics, offering clear, actionable insights. There is nothing worse than spending valuable time using a system that provides insufficient, unclear or incorrect data, leading to repeated and unnecessary work, especially in challenging environments like trackside areas. With its wide range of measurements and reliable insights, CableGuardian ensures system condition assessments are made efficiently and are right the first time, enabling areas that require spot renewals to be identified effectively.

The Key Benefits of CableGuardian

CableGuardian provides a data-driven approach to capital works on signalling power systems that focuses on safety, efficiency and sustainability. Its continuous monitoring of key parameters, like insulation resistance and voltage drop, help teams find and fix issues while keeping services running. Temporary deployment options allow rail asset managers to use Tier 1 and Tier 2 condition-based assessments to evaluate system performance before committing to a permanently installed CableGuardian system, if they wish.

The benefits of adopting CableGuardian are clear: less disruption, optimised resources and increased reliability. By basing decisions on condition assessments, CableGuardian moves asset managers away from costly blanket renewals to more strategic, budget-friendly solutions.

This new renewal approach is resource-efficient, enabling teams to do more with less.

Learn more about Viper Innovations' CableGuardian by visiting our [website](#).



CONDITION-BASED SPOT RENEWALS FOR RAILWAY SIGNAL POWER SYSTEMS

Proven Tier 1
monitoring technology
supporting rail
operators since 2018

6+
YEARS

CableGuardian is an advanced insulation monitoring and fault location system for signalling power systems. It enables targeted replacement through advanced diagnostics that proactively monitor degradation over time, providing early warning of graceful decline as well as detecting sudden faults in live signalling systems.

CableGuardian delivers significant cost savings in asset renewal projects by prioritising renewals based on asset condition. This approach optimises resources, reduces costs, and extends asset lifespan, ensuring reliable and safe signalling systems.

Integrating CableGuardian into renewals offers several advantages:

Reduced Survey & Design Costs — ✓

At project inception, the **CableGuardian** portal maps assist with FSP location, cable length calculations, and scope visualisation.

Optimise Feeder Material Costs — ✓

Measurement data trends, like feeder voltage and current, help inform legacy feeder design.

Renewal Prioritisation — ✓

CableGuardian data helps prioritise the feeders due for renewal based on condition.

Enhanced Assurance — ✓

CableGuardian ensures assurance across survey, construction, commissioning, and handover.



Helping passengers arrive on time

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