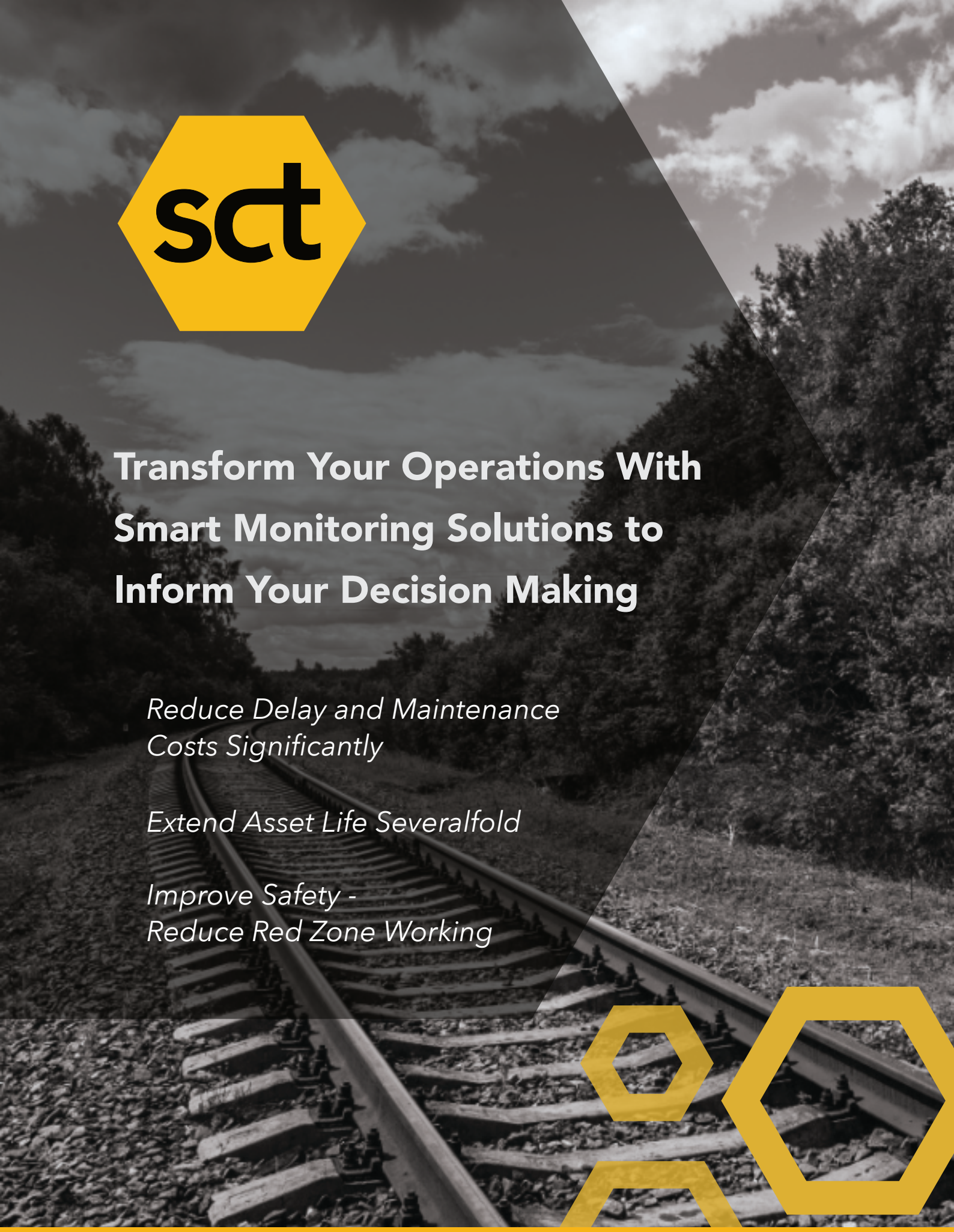


Transform Your Operations With Smart Monitoring Solutions to Inform Your Decision Making

Reduce Delay and Maintenance Costs Significantly

Extend Asset Life Severalfold

Improve Safety - Reduce Red Zone Working

SWIX **SMART WASHER**

SWIX

Remote Asset Monitoring

Remote monitoring is a critical function for enabling preventative and predictive track maintenance measures that prevent failures arising from asset health and track quality.

As such, it is essential that Infrastructure Managers are provided with sufficient forewarning of any impending issues through historic and real-time asset health data and algorithms, enabling them to plan preventative maintenance measures several weeks in advance.

This critical need gave rise to SWIX, which was designed to remotely monitor track substructure and critical components when rolling stock pass, to extend asset life, eliminate service affecting failures and optimise maintenance schedules.

Troublesome Assets

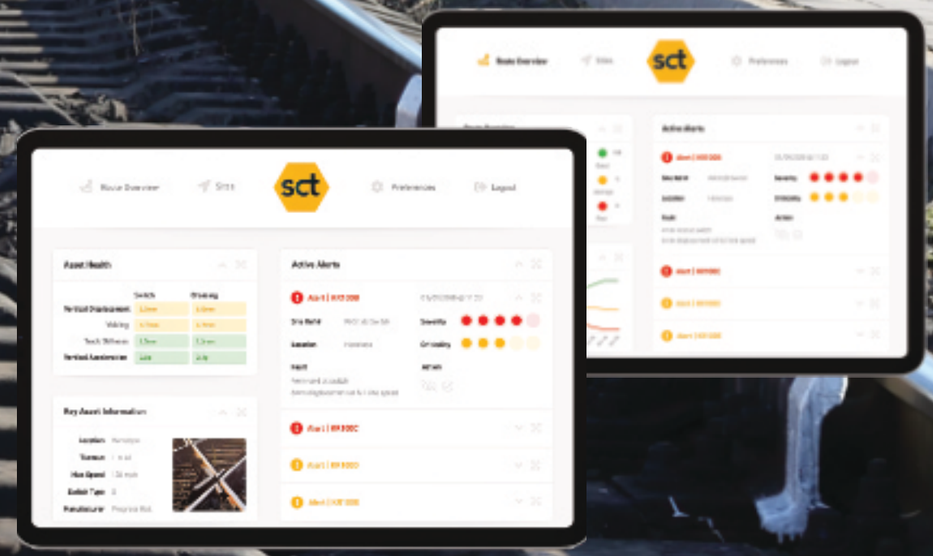
Switches and Crossings (S&Cs) are used to guide trains from one track to another. S&Cs are not the only assets to monitor but they are certainly amongst the most important.

As a troublesome asset class, S&Cs account for 20-30% of infrastructure related delays. During CP5, S&C failures on Network Rail infrastructure caused 24M delay minutes and amassed £364M in delay minute costs. Globally, £11B spent is spent annually on S&C maintenance and replacement.

Remote Condition Monitoring

SWIX is an end-to-end remote condition monitoring solution for predicting and preventing asset failure. This IoT solution features sensor nodes placed at critical areas of the asset to dynamically characterise the component health and substructure condition as rolling stock passes the site.

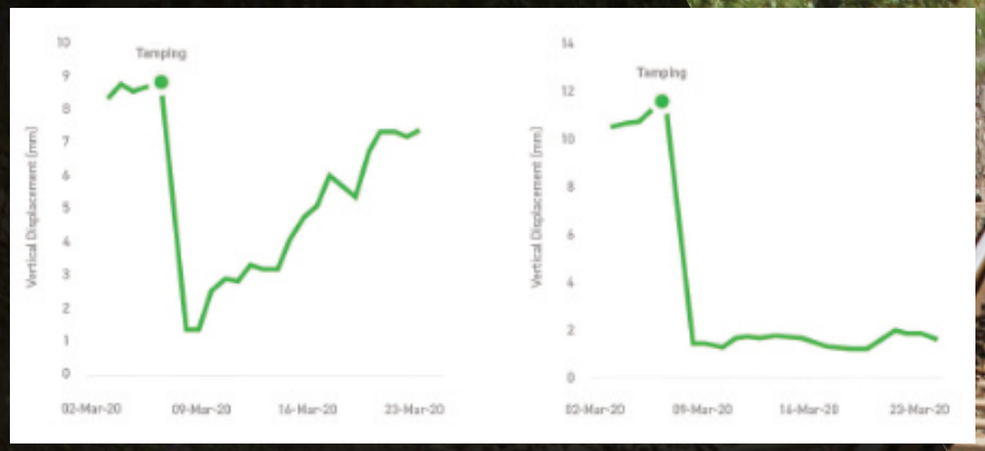
Information captured by the device is periodically transferred to our Smart Cloud where it is analysed and processed to generate key metrics; all of which may be viewed by Infrastructure Managers. The solution ultimately enables asset owners to predict failures and conduct preventative maintenance, offering a step-change in the cost efficiency and reliability of assets such as S&Cs.



"Switches & Crossings are one of our most critical, complex and troublesome infrastructure assets" – Network Rail*

* Reference to NR challenge statement – resilient S&Cs http://cdn.networkrail.co.uk/wp-content/uploads/2019/06/ Challenge-Statement-SC-Reliable-and-resilient-crossings.pdf

SWIX



Predicting and Preventing Failures

SWIX addresses this challenge by ensuring Infrastructure Managers are provided with sufficient forewarning of any impending issues through historic and real-time asset health data and algorithms, enabling them to plan preventative maintenance several weeks in advance.

A dashboard provides remote access to real-time asset health data, 24/7, 365 days a year. A route overview provides section managers with an indication of the health of all their assets, allowing them to instantly identify any existing or impending issues. This ensures the highest priority maintenance activities can be conducted during engineering hours.

Optimising Maintenance Interventions

Tamping and ballast renewals are highly disruptive and expensive activities, costing up to £5M/km. As a result of the costs involved and the limited opportunities to conduct tamping, it must be carried out at the optimal time.

Through SWIX's historic, real-time and predictive asset monitoring capabilities, Infrastructure Managers can identify the optimal time to tamp a site. Post tamping, SWIX delivers detailed data to validate successful tamping operations.

Understanding Where to Monitor

Although S&Cs can be over 100 metres long, 90% of S&C failures occur at the crossing nose and the toe of the switch. Therefore, a typical installation features two SWIX sensors, one at the toe of the switch, and another at the crossing nose.

With devices installed at these locations, the Infrastructure Manager can monitor the most critical and troublesome components of the S&Cs.

Although S&Cs are typically important assets to monitor, the SWIX system is also fitted at transition zones or on plain lines and in other areas where remote asset monitoring is required.

SWIX

Identifying Problematic Assets

Need to focus on a particularly troublesome asset? The Smart Cloud enables Infrastructure Managers to remotely assess the condition of their most critical assets outside of engineering hours without having to conduct site visits.

This reduces the time, cost and health & safety risks associated with maintaining the most critical assets on the network.

Installation

Maintenance windows are short and working on track presents several Health & Safety risks. SWIX has specifically been designed to minimise time on site. The typical installation time is less than 10 minutes per device.

For concrete bearers and sleepers, SWIX features a proprietary adhesive mounting solution which does not require drilling and does not weaken the bearer or sleepers in critical areas.

An alternative mounting arrangement is available for timber sleepers and bearers. Safely inspecting hazardous and hard-to-reach locations is a significant risk to workers and business operations.

Using predictive maintenance, rail companies can reduce the cost of manual and intensive monitoring in favour of technology solutions that gather data to inform maintenance decisions.

Early maintenance intervention will reduce costly late-stage failures and asset write-offs – ensuring your maintenance team is more effective, whilst also reducing costs.

We understand the demanding environments within the rail sector and are working to create a safer, more productive industry.

SWIX

SMART WASHER

Eliminate Manual Inspection of Bolts

It is imperative to monitor bolt preload at installation and during operation to reduce bolt failures and eliminate manual inspection.

Fasteners (Nuts and Bolts) are simple components but they are often safety and performance critical.

Fasteners are prone to failure in operational environments where they are subjected to severe loading, vibration or temperature cycling. Failure can have a significant impact on the safety or performance of the asset. We only have to be reminded of the 2007 derailment at Grayrigg which injured 80% of the passengers or the Sayona-Shushenskaya hydropower plant disaster in Russia which killed 75 and required the engine room to be rebuilt at a cost of $1.2 billion to see the impact these simplistic components can have on the world's most critical assets.

Predict & Prevent Joint Failures

The Smart Washer is an end-to-end remote condition monitoring solution for predicting and preventing joint failures.

Our products provide a compact, low power and cost-effective solution for load monitoring.

This technology is embedded onto an ultra-low power wireless platform, creating the first commercially available embedded clamp force sensor.

The technology will reduce bolt failures and minimise the cost and downtime associated with maintenance.

Remote Monitoring of Bolt Preload

The Smart Washer is integrated into an IoT network, whereby the data is wirelessly transmitted to a cloud server where it is stored, analysed and visualised. The cloud-based dashboard provides remote access to real-time bolt preload data, 24/7, 365 days a year.

The cloud platform enables infrastructure managers to identify loose fasteners remotely in real-time, eliminating the need for manual, on-site inspection.

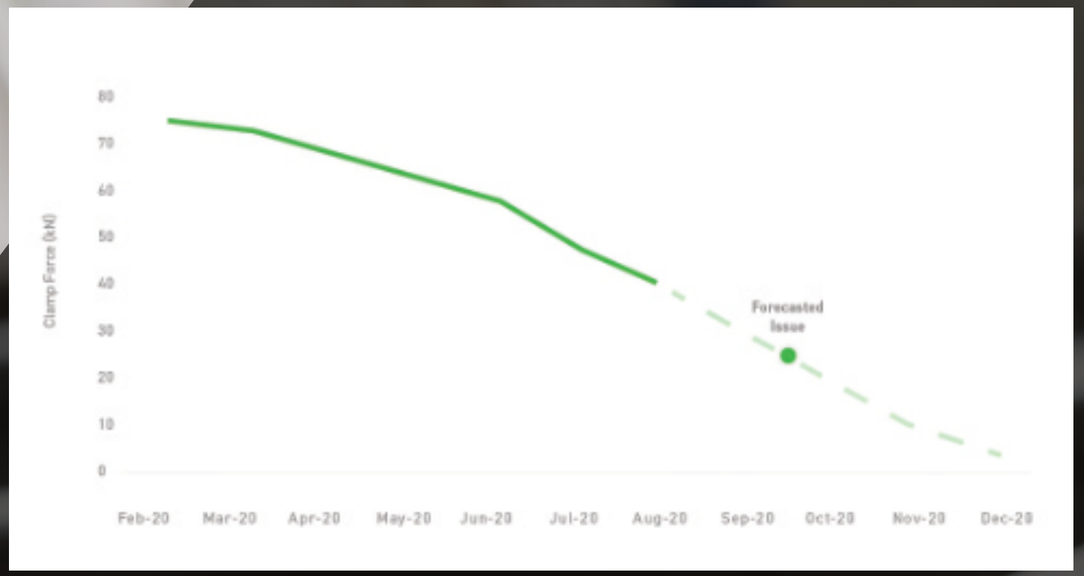
100% Compliance at Installation

The Smart Washer provides clamp force data to installers enabling them to tighten fasteners to the clamp force specified in the manufacturer's standard, rather than the traditional and significantly less accurate method of using torque.

The Smart Washer features on-board LED indicators which illuminate red, amber or green for simple identification of bolt clamp force. The data can also be sent over a local wireless network to a handheld tablet, enabling electronic audit trials to be generated.

SMART WASHER

SMART WASHER

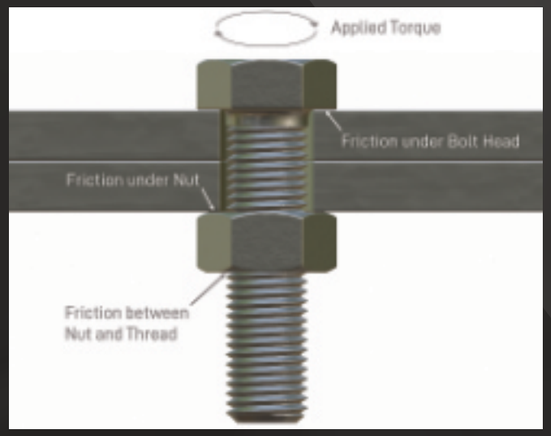


Predicting Bolt Failure

In the cloud, real-time and historic data are combined to forecast bolt preload over the next 90 days. This provides Infrastructure Managers with sufficient forewarning of any impeding issues, enabling them to plan preventative maintenance several weeks in advance.

Through Predicting and Preventing bolt failure, your most critical assets can continue to operate reliably and safely.

Measuring Clamp Force



The Smart Washer measures clamp force and not torque.

Torque is a measurement of the twisting force applied to the bolt head or nut. It is a proxy measure of bolt tension and many factors can affect this relationship, such as surface texture, rust, oil, thread condition and material type. During testing in operational environments, we have seen errors of up to 70% when using torque-based installation procedures. Incorrectly tightened fasteners will have a significantly reduced operational life.

Using SCT's proprietary and patented clamp force sensing technology, the Smart Washer provides accurate clamp force measurements, ensuring bolts are tight.

Any Bolt, Any Application, Any Industry

The Smart Washer technology is available in all standard bolt sizes from M10 – M45.

Application specific versions of the technology have also been created to meet the requirements of a specific application, industry or customer. Modifications range from alternative wireless technologies to embedding the technology into existing asset components. The technology has been designed using a modular architecture so modifications to meet your requirements can be done in an extremely time and cost-efficient manner.

SMART WASHER

SMART WASHER

SMART ECOSYSTEM

Our total software solution ensures your people have the data they need to make key operational and safety decisions – 24/7, 365 days a year. Your actionable data can be viewed in the field during maintenance activities, as well as remotely in a control room environment.

PRODUCT DESIGN

SCT has a multidisciplinary team for in-house electronics, mechanical and software design, development and testing. This means the company can develop new products rapidly in response to changing market needs, with its R&D hub acting as an incubator for fresh ideas. SCT's focus on predictive and preventative maintenance means there is an appetite to respond to new requirements and facilitate potential future development based on a consultative approach with customers.

Contact us to find out how our solutions can improve efficiencies and reduce cost on your infrastructure.

Transform your safety and performance critical operations

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