

# 'Understand the pain points before you discuss technology'

Swedish start-up Strainlabs is one of the founding participants in the Vossloh Connect digital ecosystem. Vossloh's Head of Digital **Pierre-Henri Bougeant** and Strainlabs' CEO **Csaba Madru** explain the partnership and why in rail digitalisation, simplicity is key.

When we think about the digitalisation of railways, it is hard not to let ambition run away with us. When considering the potential of the so-called Internet of Things, the hopes are even higher. Railways are vast linear assets that are made up of swathes of individual components, substructures and assets, a significant proportion of which could — in theory — be digitalised, allowing sensors, algorithms and software analysis to eliminate much of the repetitive and resource-intensive work of operating and maintaining them.

Yet if that is the dream, reality is still somewhat more prosaic. Across the industry, predictive and condition-based maintenance of infrastructure has been a topic of discussion for a decade and more. Nevertheless, widespread adoption remains elusive, leading to an all too rapid assumption that the rail industry is just not as forward thinking as other industries when it comes to embracing the data-driven future.

However, such analysis might be unfair. 'Rail is not as conservative as it is often seen in my view — it is much more open-minded than some industries,' believes Csaba Madru, co-founder and CEO of Stockholm-based start-up



Strainlabs describes its sensor and communications technology as 'the internet of bolts'.

Strainlabs. Far from looking at the digital revolution from the perspective of an entire sector such as railways, Madru sees it through the prism of a single component: the humble bolt.

The company's core focus is digitalising the bolts that are used across a whole swathe of industry, from rail fastenings to airport runway lights and mining equipment. Madru explains that the key to understanding bolt health in safety-critical industries is the preload status. 'It may seem straightforward to tighten a bolt with a certain torque and achieve a desired preload,' he says. 'However, there are several factors that can affect the result. What does this uncertainty mean for safety and reliability and how can we know that a bolt is tight?'

Preload does not stay constant after a bolt is tightened, he explains, but will vary over time due to natural causes. A bolted joint risks failing over time, and traditionally this risk has been mitigated in rail applications by manual inspection of the track. Strainlabs' aim is to deliver technology to monitor the

bolt's preload status automatically, and then transfer that data wirelessly to the team responsible for its maintenance.

### Mature technology

Madru says the company's technology is well established. It uses standard bolts fitted with small battery-powered sensors that are able to monitor preload with a very high level of accuracy; Strainlabs reports that its bolts can provide a reading every 10 min for up to five years. 'Every bolt has a unique ID, which makes it possible for the system to inform the maintainer of the exact position of an expected failure before it actually occurs. Afterwards it's too late,' Madru adds.

The maturity of Strainlabs' technology and its use in other industries is a key reason why in October last year it was one of a select group of digital start-ups which joined the Vossloh Connect platform. This is an ecosystem of digitally driven products and services aimed at optimising rail operations and infrastructure maintenance.

According to Vossloh's Head of Digitalisation Pierre-Henri Bougeant,

the company's strategy was driven by a recognition that its clients had 'pain points' that Vossloh alone could not solve.

'Our philosophy is to find out what our customers are struggling with first, and then think about the technology needed to help address them.' With Vossloh Connect, the company has identified 10 issues, of which the loosening of bolts on fastenings and rail joints is just one, where bringing in external partners may prove beneficial.

This helps the start-ups too, Bougeant believes. 'Many young technology firms struggle to break out of their home markets, however strong their products are,' he says. 'This is something a company like Vossloh can help with — we'll get a partner like Strainlabs visible internationally, while we benefit from the maturity of the technology they have developed.' At this point, he is keen to stress that Vossloh Connect does not 'white label' its partners; the Strainlabs name remains throughout.

Madru confirms that his business 'saw the potential use cases in rail' but needed a bigger partner to break down the significant barriers to entry, hence the approach to Vossloh. 'The reality is that the preload status of bolts is something a lot of railways are really worried about,' Bougeant adds.

### Cost-effective options

Reflecting on the broader question of how digital initiatives like Vossloh Connect can drive change in the industry, Bougeant is adamant that the commercial challenge must be addressed.

'The cost of the technology must be 100% aligned with the cost of the customer's pain point,' he insists. 'It is not viable to be paying €100,000 to get a data feed from a single rail joint. The return on investment of IoT tools must be overwhelmingly positive.' In this regard, he believes the market trends have a long way to shift. 'We are ideally

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Pierre-Henri Bougeant, Head of Digital, Vossloh



looking for technology at a tenth of the price that some players are offering today,' he explains.

Part of the answer to resolve the conundrum is to be ruthless in rejecting 'optional extras'. Bougeant cites railways that have trialled IoT and related digital tools to drive predictive maintenance 'in four areas, and they've come back to us saying it has helped in three of them. So, they ask, who pays for the fourth? The cost is still there.'

Bougeant explains that one of the benefits of a partnership such as the one between Strainlabs and Vossloh is that it enables a clear focus on one specific element of the railway maintenance workflow. 'We might be talking about one bolt on one fishplate. But if we can prevent one track worker from needing to walk through a tunnel in the middle of the night to check a single component, then we've addressed a pain point.'

From Vossloh's perspective, an enduring challenge relates to the difficulties faced by railways around the world. While there are clear commonalities — the need to verify as cheaply and accurately as possible the condition of rail fastenings, for example — Bougeant sees more nuance in what constitutes a customer 'pain point'. 'Some railways are talking to us about their point machine failures. Others are asking what we can do to help them understand asset life better — why does a particular component last so much

10 issues that may benefit from bringing in external partners have been identified by Strainlabs and Vossloh Connect

Turnout renewals in Sweden. Vossloh believes the key to successfully deploying digital tools for complex maintenance lies in understanding the pain points the customer is suffering.

longer at one location than another? These are the types of questions we hope Vossloh Connect could answer.'

### Simplicity above all

Both men agree that cultural change within the rail sector is inevitable as many older workers retire and a more digitally aware generation replaces them.

'Organisational change often takes time,' says Madru. 'We can say that digitalisation hasn't yet taken off in rail, but how long was GPS around in military use before it became an application with much wider public deployment?'

Bougeant suggests that part of this cultural shift will be a more balanced understanding of much-discussed concepts like predictive and condition-based maintenance. 'Digitalisation sometimes generates more costs in the short term due to additional maintenance needed as a result of an increased understanding of the health of assets. But usually that better understanding and increased short-term cost results in an improved overall lifespan of the asset, because it will operate in a better condition, for example with reduced metal fatigue.'

As these paradoxes become clearer, he feels the railway faces 'a pivotal moment'. The leaders of operating companies and infrastructure managers are keen to embrace a digital way of working, 'but they understand risk and they need to have trust in a new technology. They want to understand the algorithms and how they function — only when the trust is there can workflows change.'

Madru concludes by returning to the topic of the humble bolt. 'With a digital innovation project, it really helps to pinpoint a single thing,' he believes. 'It's much easier to make a case for using an IoT tool on a single bolt. Its condition can be discerned from a single numerical value. You immediately know if it needs to be tightened.'

As the rail sector's digital journey gradually evolves from radical innovation to become standard practice, Madru leaves a key message: 'technology pioneers have a responsibility to deliver simplicity.'

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Photo: Kasper Dudzik