

Worldsensing

Making Monitoring Smarter to Improve Rail Safety

Trimble and Worldsensing Integration Offers Automated Wireless Monitoring Solution



The UK government report about the November 2020 Sheffield station freight train derailment makes for sober reading.

The accident, it said, had been caused by gauge widening after track screws had failed, “several weeks, or perhaps months, before the derailment, but the failures had not been identified.”

Thankfully, no one was injured in the incident. However, the

derailment highlights the fact that rail track monitoring and maintenance still has a way to go as we enter the 2020s. Fortunately for the rail industry, it is now easier to deploy tools that could help to avoid accidents such as the one in Sheffield. And these tools are getting better all the time.

Wireless Remote Monitoring

The combined wireless monitoring systems from Trimble and Worldsensing deliver almost continuous, real-time data on critical track measurements including cant, twist and vertical alignment, but also increasingly process data so engineers can react immediately when measurements surpass user-defined thresholds. The difference between today's monitoring methods and those of a decade or so ago is significant. Historically, track inspections were carried out by technicians who took manual measurements and recorded the condition of tracks with photos and sketches.

This process was costly, time-consuming and prone to errors. And it meant rail operators only had an incomplete picture of track conditions, making it easy for potential failures to go unnoticed. In recent years, however, wireless equipment has changed the picture considerably. Trimble and Worldsensing have pioneered the development of robust rail monitoring solutions that can be installed almost anywhere, sending sensor readings up to every few minutes to remote systems for immediate integration into the analysis software.



IoT-based Operations

The deployment of IoT systems in the rail industry has mainly been a result of the need to monitor tunnels, bridges and trackside structures during the construction and operational phases. These systems operate wirelessly, eliminating the danger of data

loss through cable failure. And, when they implement low-power technology, the benefits are even stronger since they allow several years of uninterrupted operations without the need for new batteries.

Given the importance of cost-effectiveness in new railway projects, it no longer makes sense to rely on manual readings in most project environments. Digital railway systems are a must and wireless IoT technology can support this transformation. Such technology can be used to improve the efficiency in railway construction projects but also can be reused to improve the maintenance of its physical infrastructure. However, monitoring railway networks with wireless technology can deliver massive volumes of data, and if these are not processed in a timely fashion, there remains the potential for a fast-evolving fault to cause damage.

Surveying-based Operations

Railway construction projects require the highest levels of precision combined with rugged reliability. Trimble offers precise optical solutions for surveying railway assets during construction and operation projects with its portfolio of total station and 3D laser scanning technology. Trimble systems provide rich data and precision on asset movement and conditions that affect the design, construction and maintenance of physical infrastructure in every condition. Optical technology can be automated to provide real-time data capture alongside IoT-based geotechnical solutions providing a full above- and in-ground monitoring system.

Integrated Data Processing

Because of this, Trimble and Worldsensing are increasingly focusing on the automated processing and analysis of data, vastly reducing the time and cost involved in collecting and handling critical information. Take a rail tunnel that could be affected by nearby construction, for example. With IoT, monitoring the integrity of the structure might be as easy as installing Worldsensing's Loadsensing laser-tiltmeter wireless sensor device to measure the distance and angular movement of the tunnel walls.

These IoT wireless sensor devices communicate with a remote gateway using long-range, low-power radio (called LoRa), and from there the data is fed into Trimble 4D Control™ (T4D) real-time monitoring software for analysis and reporting. If any parameters indicate cause for concern, for example because the tunnel walls are starting to move, the system will issue an alert directly to predetermined stakeholders. This helps rail operators respond in minutes to practically invisible threats that could put lives in danger – although alerts can also be configured according to urgency, so senior decision-makers are not bothered by minor issues.

In conclusion, the complex nature of today's rail projects, combined with stricter policies around detecting movement of existing structures for safety and maintenance requires a robust, integrated, automated monitoring solution. The Trimble-branded geotechnical product line, powered by Worldsensing, along with the connected Trimble's

surveying technology, provides a fully automated wireless monitoring solution that helps minimise field visits and increase safety. This gives the flexibility to build the most advanced wireless monitoring system to accurately monitor railway projects with the T4D software platform. By measuring millimetre-level movements and minute rotations in the track, railway operators can predict and react to emergencies before they even happen, ensuring public safety and greater visibility into site conditions.

To find out more, visit Trimble.com/geotech and Worldsensing.com.

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