Remote sensing technologies keep rail maintenance on track

Unmanned technologies such as Earth observation satellites and drone-borne sensors can provide critical railway maintenance support. Remote sensors were demonstrated in real-life situations and are now set to be brought to market.

Around a third of railway operating budgets are devoted to labour-intensive maintenance work and preventive interventions. Putting in place better maintenance strategies could help operators achieve significant cost savings and reduce the overall lifetime cost of infrastructure assets.

“The MOMIT project was driven by the needs of public and private companies in charge of railway infrastructure monitoring to increase safety and achieve operational efficiencies,” explains project coordinator Valeria Donzelli from E-GEOS in Italy.

“We wanted to develop monitoring solutions that could be easily integrated into the daily operational
Donzelli notes that the project results also potentially address other sectors, such as general infrastructure and road network monitoring, and underground inspections: “Civil engineers, governments and insurance companies could all use these new techniques to reduce their monitoring costs.”

**Remote sensing**

The Shift2Rail Joint Undertaking-funded MOMIT project was launched in September 2017, to harness the potential of remote monitoring technologies.

The effectiveness and cost-efficiency of applying these technologies in railway infrastructure management was demonstrated through six main application cases, and then validated in real operational environments.

“First, we focused on monitoring ground movement around the infrastructure using satellite data analysis,” says Donzelli. “We then used a combination of optical and radar satellite data to monitor soil moisture and bodies of water close to the track, to provide timely alerts in case of potential floods.”

Satellite data was also used to identify natural hazards along the track, such as overgrown vegetation. Drones equipped with innovative sensors were used to monitor electricity infrastructure along the network.

“In addition, a combination of satellite and drone data was used to identify any possible weaknesses in civil engineering structures like bridges, with the possibility of building up 3D models from the acquired data,” says Donzelli.

“And finally, optical and radar satellite data was used for safety monitoring. Any anomalies or illicit activities along the track were quickly detected.”

**Operational benefits**

Completed in October 2019, the MOMIT project represents a significant improvement over existing monitoring procedures. These have often required manual inspections on and around tracks, which can be dangerous, cumbersome and time-consuming.

Using satellites and drones means that there is no need for personnel to walk along the rail line, no need to block the circulation of trains during monitoring operations, and thus, no disruption to train schedules.

“The project provided us with the possibility of presenting our technology to different railway users in Europe and collecting their feedback,” says Donzelli.
“This meant we were able to show how remote sensing technologies can support railway maintenance in real network situations. We were also able to confirm that this technology can support monitoring activities at a sustainable cost for final users.”

Several tools and methodologies completed during the project have since been earmarked for commercialisation. New remote sensing rail network monitoring tools are expected to hit the market in the coming months.

“I am proud that we have contributed to the preparation of tomorrow’s engineers and increased their competence in state-of-the-art research areas and applications.”

**Keywords**

MOMIT, transport, rail, infrastructure, satellite, remote sensors, civil engineering, maintenance, drone, Shift2Rail

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