

ASC GmbH

Continuous Infrastructure Monitoring at 300km/h

Railway infrastructure monitoring is cumbersome, disruptive and expensive. Or is it?

Enabled by ASC sensor technology, Turkish State Railways (TCDD), Siemens Mobility and DB Systemtechnik GmbH decided to take an innovative approach: continuous infrastructure monitoring (CIM).

Rail infrastructure monitoring needs to occur regularly, typically using special machinery that disrupts regular train services. The aim is to ensure that any signs of fatigue or other parameters running out of spec are detected early, so that critical maintenance can take place in time and avoid costly breakdowns and service disruptions.

Increased Capacity and Ride Comfort

TCDD wishes to minimise these service disruptions yet increase capacity and ride comfort on two newly built high-speed rail links from Ankara to the cities of Konya and Eskisehir, and another from the capital to Istanbul. Therefore, the national Turkish operator has been collaborating with Siemens Mobility Türkiye and German rail infrastructure specialist DB Systemtechnik to implement constant monitoring of rail tracks and

other infrastructure from high-speed passenger trains while in active service.

To that end, a Siemens Velaro train has been equipped with the latest innovative technologies to conduct all necessary measuring activities in real time. Future risks will be proactively identified, too, by integrating historic data and calculating the appropriate time for preventive maintenance, repair or replacement to take place. The approach is based on years of CIM experience gathered on the German railway network.

Stable Monitoring ‘Where Wheel Meets Track’

A critical success factor for CIM to deliver valid results is the use of the most robust and stable sensor equipment. *“For this reason, we have been relying on ASC sensors,”* recalls Dr Klaus Ulrich Wolter, Senior Engineer Onboard Infrastructure Monitoring at DB Systemtechnik. *“At Deutsche Bahn, we’ve been conducting continuous monitoring from high-speed in-service trains since 2013.”*

ASC sensors have been in use since 2018. *“In five years with almost three million kilometres covered by some of our CIM trains, ASC’s sensors are still running*

Siemens Velaro TR





Installed DB Systemtechnik sensorbox mounted on the wheelset

smoothly. It's that reliability and the cutting-edge expertise of our partners that we are also offering to our customers, in Türkiye as well as around the world."

The CIM-equipped Velaro for Türkiye will be able to conduct comprehensive monitoring at speeds of up to 300 kilometres per hour and beyond. What counts, therefore, is the long-term stability of all sensors in use. *"We need to position the sensitive equipment as closely as possible to where the wheel-track interaction happens,"* explains Wolter. Therefore, ASC accelerometers and gyroscopes have been integrated in tailor-made measurement systems embedded directly at the axle box.

Predicting the Future

Longitudinal height is the most critical track geometry parameter. *"It changes more rapidly than other variables of the inner track geometry and is of great influence on operational quality,"* states Wolter.

"Other key parameters that our CIM system keeps monitoring include track twist, calculated from gyroscope signals, as well as dynamic alignment resulting from lateral accelerations," says Wolter.

The latter are also used to assess railroad switches and insulated joints, while ride comfort is another important parameter established from these acceleration forces.

In all this, the DB Systemtechnik team needs highly accurate results. *"Since once you start determining future maintenance needs, every little inaccuracy widens the window of uncertainty,"* says Wolter. This is another reason why DB Systemtechnik has been partnering with ASC, as even the smallest inaccuracies

could trigger major uncertainties and, therefore, costs for the customer.

CIM Reduces Costs

"The beauty of continuous infrastructure monitoring is that we're now able to automatically monitor and proactively evaluate all components along the track, without having to delay or stop other traffic," highlights Yilmaz Tosun, Senior Manager – Business Development & Sales at DB Systemtechnik.

The advantages of moving from corrective to data-driven 'predict and prevent' maintenance are compelling. *"To date, we've seen cost savings of up to 30 percent compared to the use of dedicated standalone measurement trains – in addition to significantly lower repair and maintenance costs and enhanced operational quality."*

For this approach to have the intended impact, DB Systemtechnik is able to fit all necessary measuring equipment on to any train. In addition to ASC's inertial sensors, this also includes technologies for the monitoring of trackbed density, overhead line condition, overall train operation and various perception systems. *"Today, the Velaro is not only the fastest, but also the most comprehensive measurement train ready for active service,"* Klaus Ulrich Wolter is convinced.

Applications are almost endless. *"Based on the latest technologies and experience gathered with our flexible and reliable partners, we are able to turn nearly any in-service train into a fully equipped, automatic CIM train,"* he says. *"To ensure safe, sustainable and productive railway mobility, we believe all infrastructure will be monitored this way in the future."*

Read more [here](#).

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