



INFRA

Fact Sheet

Sensor Test Runs

Measurement Runs Provide Exact and Uniform Coordinates

Exact and complete comprehension and immediate documentation of railway corridors are a significant basis of safety and efficient management of infrastructure plants. A specifically developed measuring system of different sensors allows for uniform data capturing and recording.

The status of as well as changes in railway infrastructure must be recorded and documented comprehensively and precisely across prolonged periods of time. Bridges and tunnels, with lives of about 50-100 years, versus new construction projects such as Unterinntal or the new section of Vienna – St. Pölten, serve as an example to the point. Both age structure and availability of data and information for quality documentation are very heterogeneous.

Status Quo

Traditionally, positions of objects along railway infrastructures such as signals, masts, switches, are given in the form of kilometre-data in the course of individual track sections. The data relate to the kilometre panels mounted on masts or other structures. In practice, e.g. to find an object for maintenance purposes, the on-site panels provide orientation. Equally, the position of new objects is defined. Thus, most of the time, manual on-site measurements in the track area are required. Aspects of quality and economic expense have to be considered in this regard.

Objective of the Project

The task to be achieved in the sensor tests project was thus to develop a non-touch measurement system, ZL, which – mounted on a rail vehicle – is able to render a drive-by documentation of the relevant objects. This does away with blocking tracks, presently necessary to ensure the protection of workers in the track areas. At the same time, all objects can be documented in a uniform system of coordinates, which entails great advantages in terms of further data processing as well as depiction, e.g. in the ÖBB's own GIS (Geographic Information System). All technical areas thus access the same data, rather than keeping their own separate records.

The first category of objects to be documented by means of this sensor platform is the pegging-out of track points on the site. These points are attached to the catenary supports (overhead contact line masts) in the form of metal bolts and serve the purpose of high-accuracy track survey. At the same time, the positions of the catenary supports can be calculated.

Sensitive Sensors Provide Top Quality

The measurement system is being further developed on a permanent basis. The basic equipment always includes two high-quality GPS recipients with antennas mounted on the roof of the railcar (railway waggon). All objects are derived from these positions, which are accurately evaluated following the measurement drives. The sensors on the measuring frame comprise laser scanners, infrared flashlight cameras (for uniform lighting of the photos even at night or in tunnels), inclinometers, as well as an inertial measurement unit, which, among other tasks, is needed to bridge GPS holes as occurring in tunnels. One laser scanner records the surroundings while driving, while the second scanner is used to detect an overhead contact line mast. When a mast is passed, the scanner triggers the cameras and flashlights to gain images of the mast bolts. High-accuracy time synchronisation by means of a special time card in the computers is essential for the quality of the data obtained, as the test vehicle is running along the section at a speed of about 80 to 100 km/h. Ahead of any run, the mutual position of all sensors must be examined, as minimum shifts cause inaccuracies in the object coordinates.

(Image: Infrared image of an overhead contact line mast (catenary support) with mast bolts and grounding cable, taken while looking out of the vehicle during measurements.)

Infrastructure Objects in Railway Areas

Infrastructure objects in railway areas are primarily the sections and railway stations with tracks, switches, buildings and platforms, installations for train operations such as signals, as well as objects of general energy supply and telecommunication, level crossings, noise protection walls and, frequently, adjoining artificial or natural objects relevant e.g. for planning and maintaining of rescue paths.

Outlook

Currently, measurements are made at specifically selected sections to test the system. The carrier vehicle is a 4061 engine with a lateral sliding door to which the measuring frame with the sensors can be attached.

In the subsequent project stage, further objects will be documented, including switches and objects in the area in-between the tracks. If the measurement system proves itself in practice, it will provide an economical basis for Austria-wide measurements to be used by all sections of ÖBB Infrastruktur AG. The works and expertise of ÖBB Infrastruktur AG is internationally recognised. For its innovative approaches in storing and processing the enormous amounts of accruing data, ÖBB Infrastruktur AG was awarded the "Oracle Innovation Award" in 2013.

PROJECT PARTNERS

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