Name of research institute or organization:

HASLERRail AG Bern

Title of project:

Test for an improved speed sensor for railway ETCS application

Part of this programme:

Test on SBB vehicles ICBT, RE460; Test on ÖBB vehicle in collaboration with Alstom Transportation; Test on IC1 DB in collaboration with Siemens

Project leader and team:

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Project description:

The introduction of the new ETCS System by the railway companies in Europe requests an improved and more reliable speed measuring system on the trains. In winter time, train companies in Austria and Switzerland are often facing traffic delays due to insufficient availability in the train odometry systems. The root cause is often the unavailability of, with snow and ice packed, speed sensors.

HASLERRail AG has developed a new speed sensor based on optical analyses of the rail head surface to overcome these troubles (CORRail 1000).

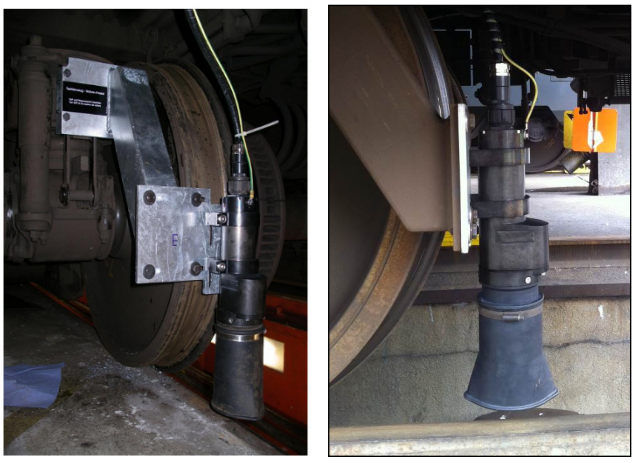

Figure 1. CORRail 1000 Sensor mounted on train

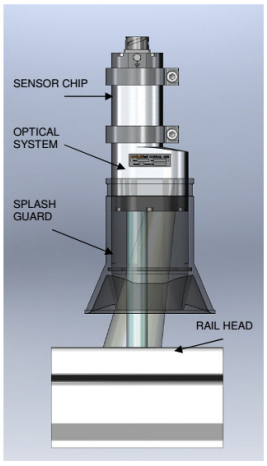

Figure 2. CORRail 1000

One of the most critical factors for such a sensor is to prevent dirt and dust accumulation in the optical path.
The most critical part is the front glass. It must be totally protected.
A specially developed aerodynamic splash guard and a protection tube protect the sensor against such environmental effects.

To test the reliability of the sensor under heavy winter conditions we conducted different practical experiments at Jungfraujoch.

Weather Conditions May 26./27. 2015: Nice weather, wind about 45-60km/h, temperature -8°C.

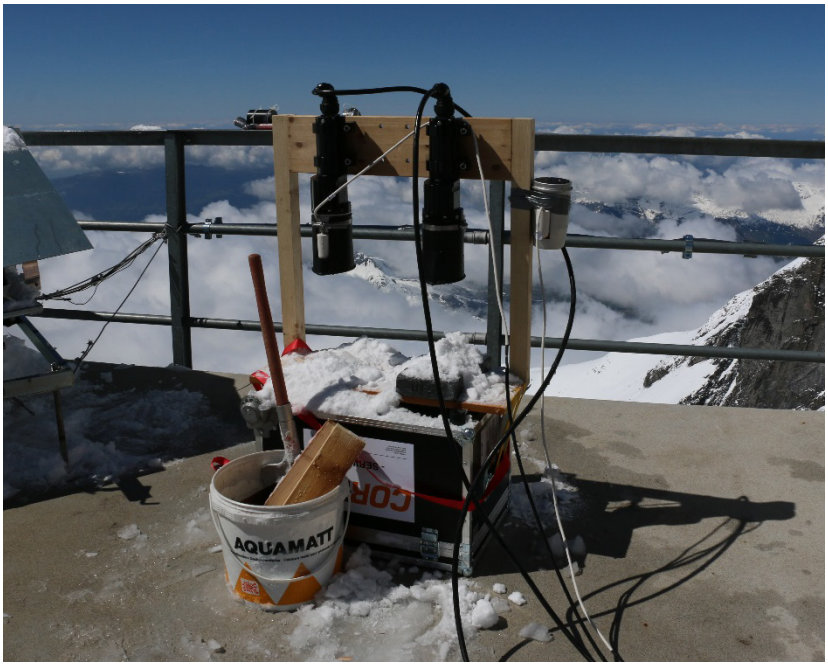

Figure 3. Test set-up.

We mounted two sensors on a rack outside on a platform on the Sphinx terrace.
One sensor was equipped with a splash guard and winter kit, the other without winter kit.
The winter kit does include, among other things, an electrical heater inside the protection tube, controlled by a thermostat.
We used different heater models with variable heating power.

Procedure:
Both sensors were stuffed with snow and the time until the sensors recovered was measured.

Results:
We could prove the positive impact of the winter kit, the time for recovering was much shorter.
Within 1 to 4 Minutes the system recovered, depending on the quantity of snow we stuffed in the protection tube and how much it was compressed.
In consideration of the practical application on a vehicle in service the recovery time is definitely too long.
The tested solution is not applicable!

Conclusion:
The general design of the splash guard, the choice of material and the design of the heating have to be reconsidered!

Key words:
Speed sensor, ERMTS, ETCS, HASLERRail, SBB

Collaborating partners/networks:
SBB
Alstom Transportation

Scientific publications and public outreach 2015:

International standards and literature:
UIC: *Compendium on ERTMS.* Eurail Press, 2009, ISBN 978-3-7771-0396-9.
ETCS performance requirement, subset 026; subset 041

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