ETCS Conformity Testing

With its RailSiTe® railway laboratory, the Institute of Transportation Systems at DLR provides a cost-effective platform for interoperability and conformity testing that can even be integrated into development, particularly of ETCS on-board units.

The Test Automation research group is continuously working to improve the quality of the individual testing phases from preparation to reporting. At the same time, it is developing processes and methods to reduce the time and cost of conformity testing. Once research findings are verified, they are applied directly in conformity testing.

A special feature: the test sequences are performed automatically, with a robot entering the information a train driver normally would. Tests can therefore be carried out all day, thus saving considerable time.

Test evaluation is also automated. A dedicated software application compares the test log with the target values and automatically indicates omissions or deviations in the messages and responses.

Thanks to these close links between research and test projects, RailSiTe® provides a particularly efficient laboratory environment for ETCS conformity testing.

Fig.: Automated execution of conformity tests

Validation of Trackside CSS

The RailSiTe® simulation and testing laboratory has a flexible, modular architecture. This permits the simulation and testing of individual rail system components in functional and operational scenarios. By including hardware-level interfaces, a wide range of trackside components of the control and safety systems can be integrated for technical or operational hardware-in-the-loop tests.

Validation of CSS Components

Thanks to its modular approach, RailSiTe® permits the integration of a wide range of different control and safety system components into different technical-operational simulations, thus allowing validation of the functionality of individual components or combinations of components.

New Concepts for Control Technology

New concepts and approaches, such as for operator workstations, can be developed quickly and efficiently and easily integrated into operational simulations.

GSM-R Radio Track

The transmission of digital message telegrams between train and track via GSM-R(ail), introduced as part of ETCS, is crucial for the interoperability of vehicles and track corridors throughout Europe. But it is particularly in this area that differences between the individual implementations cause disruptions. By linking radio block centres with ETCS on-board units from different manufacturers, RailSiTe® provides a platform for identifying and analysing potential problems.

Track Validation

Existing national rules of operations cannot always be fully modelled by the technical concepts of the new ETCS control and safety technology.

RailSiTe® helps overcome this hurdle: new or updated rules of operation can be checked and improved in RailSiTe®, in operational simulations using fictitious or real infrastructures. Moreover, such infrastructures can be simulated in the RailSET® driver's cab simulator for purposes such as training, including a visualisation of the track in a realistic environment.

New projects can be imported into RailSiTe® and operational requirements, even stress tests, thus verified. All this is possible from the early planning stages. Another option is the – partly automated – import of existing routes into the laboratory environment, which makes it possible to identify error sources quickly. Using data from juridical recording units, specific situations can be modelled accurately and reproduced as often as required. In these models, individual modules can be replaced by real hardware, permitting the identification of error sources.

Fig.: Track plan in interlocking

RailSiTe®

RailSiTe® is DLR's rail simulation and testing laboratory. It is the implementation of a fully modular concept for the simulation of on-board and trackside control and safety technology. The flexible infrastructure provides an ideal platform for complex tests and research purposes.

RailSiTe® offers the capability to analyse, test and validate train control systems, subsystems and components. New or modified concepts can be studied effectively and efficiently with the aim of optimising operations. In co-simulations with the RailSET® human-factors laboratory, new user interface concepts can be tested in a realistic environment, either as software simulations or as hardware prototypes.

Both the development and operation of the RailSiTe® laboratory have always been independent of operators, manufacturers and national authorities.

In January 2012, RailSiTe® was accredited as an independent testing laboratory for on-board units of the new European Train Control System (ETCS) in accordance with DIN EN ISO/IEC 17025:2005. The accredited test methods are listed on the appendix to the accreditation certificate D-PL-11223-01-00. DLR's Railway Systems division is moreover a subcontractor of the Notified Body Interoperability (EBC) at the German Federal Railway Authority. DLR collaborates closely with the two other ETCS reference laboratories, CEDEX in Madrid (Spain) and Multitel in Mons (Belgium). DLR is also a founder member of the European „ERTMS Reference Labs AISBL" (ERL) association.

DAkkS Deutsche Akkreditierungsstelle D-PL-11223-01-00

TS-RailSiTe®-E-09/12

Photos: DLR

DLR at a glance

DLR is Germany's national research centre for aeronautics and space. Its extensive research and development work in Aeronautics, Space, Energy, Transport and Security is integrated into national and international cooperative ventures. As Germany's space agency, DLR has been given responsibility for the forward planning and the implementation of the German space programme by the German federal government as well as for the international representation of German interests. Furthermore, Germany's largest project management agency is also part of DLR.

Approximately 7000 people are employed at 16 locations in Germany: Cologne (headquarters), Augsburg, Berlin, Bonn, Braunschweig, Bremen, Goettingen, Hamburg, Juelich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stade, Stuttgart, Trauen and Weilheim. DLR also operates offices in Brussels, Paris, and Washington D.C.

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