

factsheet # 6



ERTMS DEPLOYMENT IN SWITZERLAND

Countrywide ERTMS rollout programme



Although not a member of the European Union, Switzerland with a considerable number of freight hubs and busy routes is implementing an ambitious ERTMS investment plan. In a country located at the heart of the European railway network, ERTMS has, without compromising the great safety record of Switzerland, significantly helped to increase traffic capacity and facilitated a modal switch and to reduce the life cycle costs of the infrastructure. With a various suppliers involved and the highest number of vehicles equipped with ERTMS in operation in the world, Switzerland is now reaping the benefits of ERTMS at full speed – and as the first country worldwide, it has been implementing ERTMS throughout its entire railway network since 2011.

What is the status of ERTMS deployment in Switzerland?

Switzerland is a leader in terms of ERTMS deployment. As an early adopter, Switzerland clearly embraced ERTMS as the train control system of choice. Consequently, the committed ERTMS strategy back from the year 2000 is gradually being implemented in Switzerland. The migration towards a pure ERTMS network is successfully under continuous implementation. Switzerland has opted for a phased deployment of ETCS with Level 1 Limited Supervision as the main operating mode and ETCS Level 2 for the main and high-speed lines. Once this programme is completed, Switzerland will abandon the obsolete SIGNUM or ZUB systems.

More than 1,000 rail vehicles are already fitted with ERTMS to operate on the national network, and today ETCS on-board units are required for network access. To travel on lines with a Vmax of > 160 km/h, vehicles must have ETCS Level 2 (driver's cab signalling). Since 1 July 2014, every newly commissioned vehicle has been required, as a basic principle, to be equipped with an ETCS Baseline 3 or at least to be designed to enable such a system to be easily retrofitted.

ETCS Level 2 operational experience has proven highly satisfactory. The lines are known to be amongst the busiest in the country, which explains why Switzerland has a very high number of trains equipped with ERTMS. At present, the following major lines are running using ERTMS as the only Automatic Train Protection (ATP) system:

- New high-speed line (NBS) between Mattstetten and Rothrist (December 2004, 45km),
- Upgraded high-speed line (ABS) Derendingen Inkwil
- Lötschberg tunnel (December 2007, 34.6km)
- Brunnen (excl.) Altdorf Rynächt (August 2015)
- Pollegio Nord Castione Nord (December 2015)
- Gotthard base tunnel (57.1km) inaugurated in June 2016, starting commercial operation in December 2016
- April 2017: Pully Villeneuve
- May 2018: Giubiasco Sant'Antonino
- October 2018: Sion Sierre

- Ceneri Base Tunnel inaugurated in September 2020, commercial operation beginning in December 2020

Ongoing projects:

- December 2020: (Bellinzona excl.) Giubiasco CBT Vezia (Lugano excl.)
- December 2020 2023: (Taverne excl.) Vezia (Lugano excl.)

An implementation concept has been drawn up for the Rhône valley that provides for the fitting and operation of ETCS Level 2 on the following routes:

- 2023/2025: Visp Brig Simplon
- 2023/2024: Roche VD Vernayez

From 2025 on, during replacement of interlockings as part of asset maintenance or if installations must be adapted due to expansion of capacity, as a basic principle, ETCS Level 2 will be implemented.



Why was ERTMS implemented in Switzerland?

Setting up an "ETCS System Authority", for the whole country, was a very important step towards a successful introduction of ERTMS in Switzerland. As stated above, ERTMS has been initially implemented on the busiest routes of the Swiss network as the train control system of choice. The reason behind this investment was to significantly increase capacity and therefore increase train speeds on the busiest segments of the Swiss national railway network but retain the famed highest levels of safety.

Due to operational and economic benefits of ERTMS, the Swiss network is now fully equipped with ERTMS, on mainlines with ERTMS Level 2 and the rest of the network with ERTMS L1 LS.

The Swiss Railway Network currently has:

- More than 3,000 km tracks fitted with ETCS L1 limited supervision
- More than 500 km track (Single Track Equivalents) fitted with ETCS L2 train control and signalling
- 7 RBCs commissioned and in operation

Which ERTMS suppliers are involved?

Switzerland is another proven success of ERTMS interoperability and flexibility. Four suppliers are currently involved on the Swiss railway network, with trackside and onboard equipment being delivered by different companies from Switzerland.

What are the benefits brought by ERTMS in terms of capacity increase?

Wherever installed, ERTMS has brought significant benefits in terms of a capacity increase in Switzerland. For instance, the use of ERTMS Level 2 on the Mattstetten – Rothrist line has dramatically improved traffic conditions: an estimated 242 trains– both freight and passengers – pass on the line every day; headways between trains have been reduced to 110 seconds whilst train speeds have increased to 200 km/h!

Similar advantages have been brought to the Lötschberg base tunnel - with even higher train speed upon availability of rolling stock performance. The Gotthard base tunnel, the longest rail tunnel in the world, is now open, with train operations running smoothly. This brings new exciting opportunities for the entire Swiss network and for all European North-South rail traffic to enhance the modal switch of road traffic to rail traffic. Work has also been completed on the Ceneri base tunnel, where ETCS Level 2 is now ready to be used in commercial operation starting December 13, 2020, which will further enhance the route capacity from Germany through Switzerland and into Italy.

The Lötschberg base tunnel: ERTMS installed on one of the busiest corridors in Europe

The Lötschberg base tunnel, which opened in 2007, was designed to provide a shorter and faster North-South rail link beneath the Alps. During the design phase, it emerged that ERTMS would help to increase rail capacity, particularly for freight, which was needed to absorb the relentless growth in road traffic between Italy, Switzerland and Germany.

To a great extent, the Lötschberg tunnel appears as one of the most challenging rail projects ever built. The tunnel is nearly 35km long, with the southern entrance located at 654.2 metres above sea level and the northern portal at 776.5 metres above sea level. Adding to this complexity is the fact that the tunnel is only partially double-track – a challenge in terms of signalling for high speed trains.

ERTMS has greatly contributed to increase the traffic capacity and maximise the success of this Swiss project plan. Indeed, the use of ERTMS Level 2 has enabled a reduction of the headway intervals between trains to three minutes; this despite the fact that trains may run as fast as 250 km/h. A "minimal" fall-back system was set up (light signals at the tunnel portal) whilst the high reliability of ERTMS has avoided the need for lineside signals within tunnels, which brings with it a considerable maintenance cost savings.

Cornerstones of the ERTMS report issued in June 2020 by the Swiss Federal Transport Office (FOT)

- ERTMS Baseline 3 on existing rolling stock not a must until 2025 due to delayed specifications of FRMCS in Europe; however, new vehicles must be equipped with ERTMS Baseline 3.

- For the same reason, ETCS Level 2 trackside projects should be halted for the time being.

- In the course of the developments within the Swiss industry programme SmartRail 4.0, further fundamental decisions will be communicated during 2020 regarding actions towards ETCS Level 2 and Level 3.

SUPPLIERS

- After examining SmartRail 4.0's concept report, the FOT shall decide, considering the existing ERTMS strategy for Switzerland and the emerging European ERTMS strategy, on the strategic direction in the course of the year 2020.

- By the end of 2019, with few exceptions, all standard gauge railway lines in Switzerland equipped with external signalling were migrated to ETCS Level 1 Limited Supervision.

- The ETCS connection is ensured at all 17 border crossings (border stations/border operation routes) to the neighbouring countries.



Want to know more about ERTMS? Please check www.ertms.net or contact UNIFE at ertms@unife.org