unife
THE EUROPEAN RAIL INDUSTRY

ERTMS
The European Railway Traffic Management System

Opening Europe's Borders

A European Success Story

September 2008

A European Success Story

ERTMS, the European Railway Traffic Management System, is a major European project developed by six UNIFE members in close cooperation with the railway stakeholders and the GSM-R industry and supported by the European commission.

ERTMS has two basic components:

- ETCS, the European Train Control System, is an automatic train protection system (ATP) to replace the existing national ATP-systems;

- GSM-R, a radio system for providing voice and data communication between the track and the train is based on standard GSM using frequencies specifically reserved for rail application with certain specific and advanced functions.

ERTMS aims at replacing the different national train control and command systems in Europe. The deployment of ERTMS will enable the creation of a seamless European railway system and increase European railway's competitiveness.

Why does Europe need ERTMS?

Currently there are more than 20 train control systems across the European Union. Each train used by a national rail company has to be equipped with at least one system, but sometimes more, just to be able to run safely within that one country.

Each system is stand-alone and non-interoperable and therefore requires extensive integration, engineering effort, raising total delivery costs for cross-border traffic. This restricts competition and hampers the competitiveness of the European rail sector vis-à-vis road transport by creating technical barriers to international traffic.

Overcoming technical barriers

Cross-border operations at a European level are often hindered by technical barriers, as locomotives have to be changed at each border or have to be equipped with the appropriate ATP systems. This is costly and significantly increases the technical and operational complexity of train sets. Drivers and maintenance staff have to be trained in each system, making their jobs more complicated and increasing the margin for error.

Removing these barriers will help to increase the performance of rail transport by levelling the playing field between road and rail transport and will ultimately provide significant environmental gains.

A long-way to interoperability: the case of the Thalys

The Thalys train sets running between Paris-Brussels-Cologne and Amsterdam have to be equipped with 7 different types of train control systems. Various factors, including the constraints of having different systems present and the "non-standard" character of train sets produced in a small series for a specific route, push up the cost of each train set by as much as 60%. Additionally the driver's cab must have a screen for each respective signalling system.

A technology supported by the European Union

The European Commission, having initiated and financially supported the development stages of ERTMS, is now closely involved in its swift deployment. In December 2005, the Commission appointed a European Coordinator to synchronise and harmonise the introduction of ERTMS across Europe. A series of 6 key freight Corridors were identified and each Corridor has its own organisation to coordinate the investment and implementation plan along the European rail network.

Specially crafted financial incentives were designed to support both infrastructure and onboard installation, thereby creating a network of key interoperable freight routes across the EU's 27 countries. To achieve this objective, the EU is also considering an ERTMS master plan, based on national investment plans submitted by all EU Member States.

Two successive Memorandums of Understanding were signed in 2005 and 2008 by the European Commission and the railway stakeholders to further deploy ERTMS on Europe's rail network. To ensure that ERTMS is constantly adapted to the railway's needs, technical specifications are maintained under the lead of the European Railway Agency in cooperation with the signalling industry and railway stakeholders.

With ERTMS, a single Europe-wide "drivers' licence" is rapidly becoming a reality, reducing the complexity of training and increasing the pool of mobile and skilled labour able to work on railway systems across Europe.
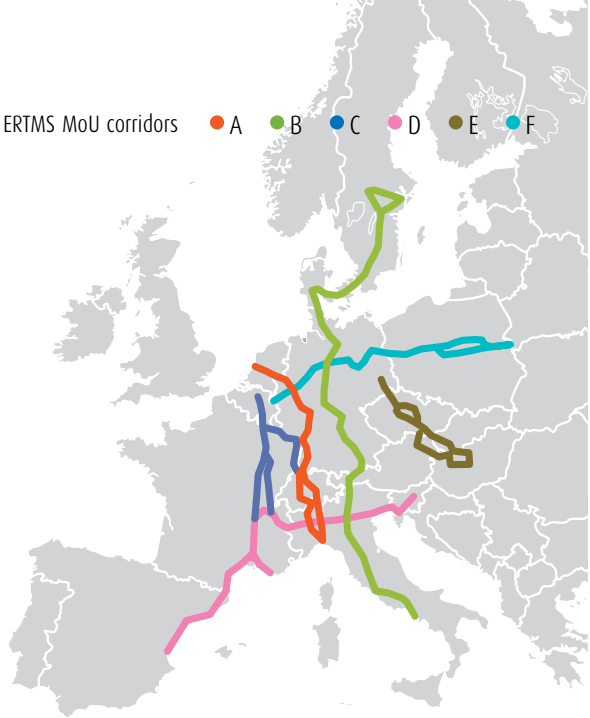
ERTMS makes European railways more competitive

ERTMS has been made possible with the support of the European Commission and the following UNIFE member companies:

ALSTOM   **AnsaldoSTS**   **BOMBARDIER**   **irg invensys** rail group

SIEMENS   **THALES**

Compatible across Europe

The technical specification of ERTMS enables operational interoperability throughout Europe and now in non-European countries. As it has been specified and tested by the supply industry and the railways, both technical interoperability and high levels of performance are assured.

Trains equipped with ERTMS systems and components manufactured by any qualified supplier are able to run on tracks equipped with ERTMS of any other supplier. This enables the easy and seamless coordination of domestic and international train services and it also encourages competition.

Making rail more efficient

Having one common traffic management system, ERTMS, Europe-wide means:

- Increased capacity on existing lines and a greater ability to respond to growing transport demands;

- Reducing Europe's CO_2 emissions by improving the competitive position of rail transport as opposed to the more polluting road alternatives;

- Lower production costs: one proven, harmonised system is easier to install, maintain and manufacture making railway systems more competitive;

- Opening the supply market: customers will be able to purchase equipment for installation anywhere in Europe and all suppliers will be able to bid for any opportunity;

- Reducing the contract lead time due to the significant reduction of process engineering;

- A simplified approval process in Europe and greatly reduced certification costs traditionally associated with the introduction of new systems;

- Improved safety for passengers, employees and freight transport;

- Europe being able to export cutting edge technology and demonstrate global leadership.

The combination of operational and technical interoperability achieved through ERTMS enables rail transport to deliver passenger and freight services, match customers' expectations and promote the modal shift from road to rail.

With ERTMS, a double rail track can easily carry 10,000 people per hour/ per direction whilst a three lane, two way highway becomes congested with only 3,000 people travelling per hour/per direction and is considerably less safe for passengers.

A New Generation of Rail Systems

Making railways more available

ERTMS is a standardised, proven system that can be integrated in many applications resulting in higher reliability and better availability than current systems.

ERTMS represents a new generation of systems provided by different manufacturers, and its connections and interfaces have been standardised and simplified. By integrating these new technologies, ERTMS is able to provide advanced maintenance and remote-diagnostics facilities.

Improving railway safety

Railways already have an excellent safety record and ERTMS will help ensure that this remains the case. It reduces the possibility for human error, providing a comprehensive automatic train protection (ATP) function where this does not yet exist.

ERTMS works as a safe monitoring system, continuously supervising the speed of each train according to track and train data. If the actual train speed exceeds the permitted data, brakes are applied automatically. This ensures the train will be stopped in front of the danger point.

This, coupled with the flexibility of ERTMS which can be applied to low-density as well as to high-density lines, is particularly important for countries where ATP systems are not yet widely deployed.

Cost effective

Several factors make ERTMS a cost-effective solution for railway companies. First of all, ERTMS benefits from economies of scale, so production costs of the system are consequently lower. Secondly, maintaining ERTMS instead of a variety of systems will ease maintenance costs, thus lowering operational costs.

Thirdly, the Life-Cycle Cost (LCC) of ERTMS will be significantly lower than for current signalling systems, improving the cost structure of the railway system as a whole.

Reduced CO_2 emissions

By improving the competitiveness of the rail sector, leveling the playing field between rail, air and road transport, ERTMS helps the EU to meet its commitments on climate change. ERTMS encourages businesses and passengers to use rail as a clean and low CO_2-emitting transport mode.

Increasing railway capacity by up to 40%

Freight traffic between the EU Member States is rapidly increasing, outpacing economic growth. Road congestion as well as environmental concerns all point to the need for an increase in rail freight capacity. Likewise, rail passenger traffic is also increasing, in particular at the expense of air travel.

There are a number of options to increase capacity, from building additional lines or widening existing tracks, re-signalling, lengthening trains and loops or platforms, to operating more frequent services and higher density trains. Whilst infrastructure-based solutions provide additional capacity, they are often expensive, time consuming and have a significant impact on services whilst they are being implemented. Of all solutions available, signalling upgrades provide the most economic way of increasing capacity. Experience has shown that a continuous communication-based signalling system, such as ERTMS, reduces the headway between trains enabling up to 40% more capacity on currently existing infrastructure.

The European Commission estimates that EUR 5 billion of investment is necessary to equip 20,000km of double track infrastructure and 10,000 locomotives.

Focusing first on selected freight corridors has provided the initial momentum in the roll-out of ERTMS across Europe. Naturally ERTMS will provide maximum benefit when it is installed and used across the full length of the corridors rather in sections, providing more throughput, greater speed, and most importantly, increased capacity.

ERTMS therefore enables the number of services on the most heavily used infrastructure to be increased. As a result, rail is able to capture a larger share of the passenger and freight transportation market. Infrastructure operators will see a higher utilisation and therefore more revenue, whereas train operators will be able to make better use of their assets by providing more capacity and more connections.

ERTMS increases the overall performance of the existing infrastructure

Improving transport capacity and punctuality: the example of ERTMS implementation in Spain

In recent years, Spain has invested considerably in ERTMS, which was installed as standard equipment in all the newly-built high-speed lines such as Madrid-Barcelona or Madrid-Valladolid.

With six suppliers involved, interoperability between the different ERTMS projects was successfully achieved. In just one year, passenger transport recorded considerable growth on the Madrid-Barcelona (79%), Madrid- Malaga (88%) and Madrid-Valladolid (109%) lines. On these three lines, punctuality rates were averaging more than 98%, attracting a considerable number of customers. This successful implementation of ERTMS also had considerable environmental benefits, since passengers are starting to opt for rail as opposed to plane when travelling between these cities. Spain is now continuing to invest in ERTMS-controlled lines not only for high-speed but also for high-density lines (for instance on the Madrid-Cercanias line).

Obsolete signalling equipment systems

The long service life of most signalling equipment is an obstacle to the rapid deployment of ERTMS. At the present rate of renewal, it will take more than 40 years to equip the main corridors of the European rail network. All new rolling stock put into service during this transition time would still have to be fitted with technology which is already regarded as obsolete, keeping production costs high.

Current investment will only reach the critical mass for infrastructure and trackside installations when a significant part of the EU rail network is fitted. Additional investment is required to speed up the process and reduce the migration period from national systems to ERTMS to a maximum of 20 years.

Without this investment, railways will remain less attractive than road freight transport and short haul air passenger transport and be less able to contribute effectively to the European Union's objectives and its economic development.

ERTMS beyond Europe:

ERTMS is also proving to be the answer for railways outside Europe, with more than 14,000km of track contracted to date. Countries such as China, India, South Korea, Saudi Arabia, Australia and Taiwan are embracing ERTMS, as it provides the best technological solution to replace or upgrade existing railway signalling systems. Even in countries where interoperability is not a critical issue such as Taiwan, ERTMS remains the ATP solution of choice, due to the high performance levels of its features.

Many other countries with more than one system or with already obsolete systems are also showing interest in ERTMS, confirming its potential as an export product and the best example of European technological excellence.

More than 30,000km of tracks are already in service or contracted to be equipped with ERTMS worldwide

ERTMS deployment in Europe

There are currently more than 17,000km of track and 3,500 vehicles already in service or contracted to be equipped with ERTMS in Europe.

Despite the growing deployment of ERTMS, a joint effort from the European Union, Member States and railway stakeholders is still required to finance and coordinate the swift migration to ERTMS. Whilst ERTMS is rapidly being installed in some European countries, others are moving at a slower pace, preventing the creation of a seamless European network.

In 2005, the European Commission initiated a project to study in detail the costs and benefits of six selected corridors in Europe. Karel Vinck has been nominated as European Coordinator to finalise this work. UNIFE and its members represent the supply industry in this group. Building on the basis of national ERTMS deployment plans of each Member state, a European migration plan is to being considered which is a further step towards a European-wide ERTMS application.

Given the fundamental role of ERTMS to improve the railway sector's competitiveness, it is crucial that investments are made as soon as possible to receive the benefits of a European seamless network.

UNIFE – the Association of the European Rail Industry – represents Europe's leading rail supply companies active in the design, manufacture, maintenance and refurbishment of rail transport systems, subsystems and related equipment. Membership also extends to associated members, mostly composed of national railway industry associations.

UNIFE's role is to represent its members' interests at the level of both European and international institutions. UNIFE's mission is to pro-actively develop an environment in which UNIFE members can provide competitive railway systems for increased rail traffic.

www.unife.org

For further information on ERTMS, check out **www.ertms.com**