



ERTMS DEPLOYMENT IN SPAIN

FROM AIR TO RAIL— INCREASING THE SPANISH RAILWAY'S PERFORMANCE WITH ERTMS



With over 2,900 km of lines already in service and an additional 2,000 km of lines planned or already in construction, Spain clearly emerges as a worldwide reference and leader in ERTMS deployment. Whilst ERTMS has contributed to the success of iconic lines, such as the "AVE" Madrid-Barcelona, where rail is gradually replacing air as the transport of choice (from 48% of market share after 12 months of service to 63% at end of 2017), the Spanish experience is also a showcase for the effective interoperability of ERTMS, with no less than 6 companies involved in various projects on the Spanish network.

Spain has 6289km of network that belong to the European TEN corridors (Mediterranean and Atlantic corridor),

What is the status of ERTMS deployment in Spain?

Under the strong leadership of infrastructure manager ADIF, Spain has embarked on a major program of railway investments, identifying ERTMS as the signalling system of choice. The first contracts were signed in the early 2000s and ERTMS now covers the major part of the Spanish High Speed network. Indeed, the "AVE" network has become a phenomenon in Spanish society and is a clear paradigm of speed, punctuality and efficiency. Travelling in AVE is fast, safe, environmentally-friendly and even "trendy".

At present, the following major lines are running using ERTMS:

- Madrid – Lleida - Barcelona High Speed line (621 km route)
- Cordoba - Malaga High Speed line (155 km)
- Barcelona – Figueres High Speed Line (130 km)
- Madrid – Segovia - Valladolid High Speed line (197 km)
- Madrid – Toledo High Speed line (21 km)
- Zaragoza – Huesca (80 km)
- Madrid – Albacete - Valencia High Speed line (436 km)
- Figueres - Perpignan High Speed international connection (45 km)
- Ourense - Santiago – Coruña -Vigo (256 km)
- Madrid "Cercanías C4" suburban network (Parla – Colmenar) (95 km)
- Albacete – Alicante High Speed line (165 km)
- Port of Barcelona – Can Tunis - Girona - Figueres Freight / Mixed traffic line (150 km)
- Valladolid – Palencia – Leon (290 km)
- Olmedo – Zamora (110 km)
- Sevilla – Cadiz (108 km)
- Valencia – Castellon (72 km)
- Granada – Antequera
- Valladolid – Palencia – León
- Vandellós – Tarragona

Other major projects are currently under construction, with several lines scheduled for commercial service within the next few years (Programmed to be in revenue service till 2023):

- Plasencia – Caceres
- Caceres Badajoz
- Medina del Campo – Olmedo
- Venta de Baños – Burgos
- Vitoria – Bergara
- Bergara – Irun
- Bergara – Bilbao
- Tarragona – Castellbisbal – Barcelona
- Valencia - Castellón
- Castellón - Vandellós
- Valencia – La Encina
- Monforte del Cid – Murcia
- La Robla – Pola
- Medina del Campo – Zamora
- Zamora – Orense
- Vigo – Pontevedra – Santiago de Compostela – A Coruña
- Sevilla – Utrera – Cadiz
- Cercanías Barcelona

Moreover there are 351 trains with ERTMS Onboard Equipment, the trains will grow to 436 by 2020.

Which ERTMS suppliers are involved?

Six UNISIG suppliers of ERTMS have been involved in the Spanish railway network, and full interoperability between their products (both on-board and trackside) has been achieved. In other words, the trains supplied by any of the 5 on-board units' suppliers in Spain (see picture below) are able to run on trackside equipment built by any of the others, which represents a major technological achievement. This brings significant advantages to the Spanish infrastructure manager ADIF, who has the guarantee that several suppliers will respond to tenders, lowering the cost of the signalling equipment through basic commercial and healthy competition.

What are the benefits brought by ERTMS in Spain?

Infrastructure manager ADIF is viewed as a pioneer in ERTMS deployment in Europe. After several years of ERTMS use in Spain it has brought considerable benefits:

- From an infrastructure manager point of view, choosing ERTMS means enlarging tendering opportunities, since any ERTMS supplier may respond to tenders;
- In the first year of service, passenger transport recorded considerable growth on Madrid - Malaga (+88%), Madrid-Valladolid (+109%) and Madrid-Barcelona (see below) lines. ERTMS not only attracted more passengers because reduction in time to connect two cities with HS Trains, but also allowed the IM to increase the capacity of the line.
- On these three lines, punctuality rates were averaging more than 98% (second only to Japan), attracting a considerable number of customers.
- As a consequence, ERTMS also has considerable environmental benefits, since passengers are knowledgeably opting for the train instead of the plane when travelling between these cities, therefore producing on average one sixth of the carbon footprint emissions as opposed to air or road traffic.
- Increase of the safety of the line. In Spain catastrophic events were caused because lines not equipped with safety Signalling system.
- Interoperability, due to ERTMS now there is traffic to and from France.

(Source: ADIF)

From plane to train: the example of the Madrid - Barcelona line

The Madrid-Zaragoza-Tarragona-Lleida-Barcelona line went into commercial service in February 2008, and is acknowledged to be one of the most successful examples of modal shift from plane to train, with the only equivalent to be found in the Paris-London and Paris-Brussels lines.

Thanks to the use of ERTMS level 2, trains enjoy record punctuality rates (see above). Travelling between the two cities takes only takes 2h30' (compared to 6 hours in the past), with an average speed of 248,4km/h.

Spanish operator RENFE estimates that the line attracted 1.4 million passengers that were previously using air transport during the first year of service. In the first 6 months the average number of passengers had already increased by 84.5%!! After the first year of service, the AVE Madrid Barcelona enjoyed a share of 40 % of all trips between the two cities. By end of 2014, the share increased to 62,3%, with 3,71 M trips between both cities (and a steady increase in ridership of about 10% over the previous year).

Additionally, international connections started in 2012 between Barcelona & Paris using the Figueres-Perpignan ERTMS-equipped line opening exciting new opportunities for cross border High Speed traffic. In 2013 new services launched by RENFE & SNCF increased the frequencies between Barcelona & Paris but also inaugurated new services to Madrid, Toulouse & Marseille.

On the Spanish side, the opening of the Atocha by-pass in December 2008 considerably reduced travelling time between Barcelona and the South of Spain. Indeed, there are now new High Speed connections between Barcelona and Seville / Malaga that don't need to pass by and stop in Madrid, reducing travelling time by more than 50 minutes.

Twinking the Excellence

Spain is quickly becoming a country of AVE lovers and ERTMS is at the backbone of the network. Air connections between cities connected via HS rail are decreasing to marginal levels as the HS rail share for connections between Madrid and Valencia is already at 88%, between Madrid and Malaga at 88%, and 63% between Madrid and Barcelona, all figures at end of 2017. The success of the AVE network based on ERTMS can be explained by the total figure of network ridership in 2017, which reached 36,5M trips, 1,4M trips more than the previous year.

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