

HIGH SPEED IN SPAIN

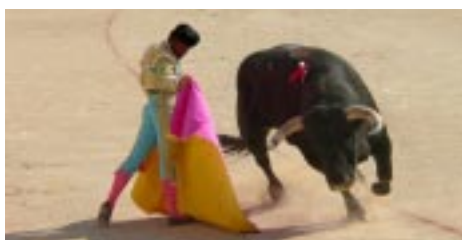
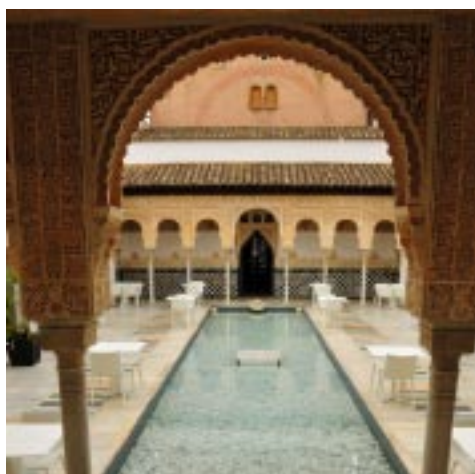
We associate Spain mainly with summer, sun and sea. Rightly so, because Spain follows closely behind France as the second most popular country in the world for taking a vacation. The Germans in particular have made Spain their favorite holiday destination.

But the country on the Iberian Peninsula with its parliamentary monarchy is also an economic success story. With sustained economic growth over the last 20 years, Spain has become the eighth largest economy in the world. Gross domestic product has increased by 3% to 5% every year over the last 10 years. The economic development has been accompanied by intensive expansion of the infrastructure. And from the beginning the development of the railway was given a high priority.

The Spanish high speed network

The broad-gauge network of the state railway company RENFE has been supplemented with a standard-gauge high speed network: AVE. The Spanish high speed network has already reached a length of some 1,500 km. The aim is to make all provincial capitals accessible within 4 hours for rail passengers traveling from Madrid. From Barcelona the maximum journey time should be 6.5 hours. This would make high speed rail a genuine alternative to the airlines. A massive effort is required to make this possible. Plans are in place to extend the high speed network to 7,000 km in the medium term, and to 10,000 km in the long term. Trains will reach speeds of up to 300 km/h on these lines. The many planned connections, including lines to France and Portugal, make this by far the most ambitious high speed railway network development in Europe.





Special requirements for the railway vehicles

The high speed network runs on standard-gauge track, electrified with 25 kV AC, 50 Hz. As a rule, high speed trains are procured from renowned European manufacturers, which operate exclusively on the new railway lines. A particular challenge is presented by the connection to the existing RENFE network, however. This runs on broad-gauge track and is electrified with 3 kV DC.

Constructing a new normal-gauge line is not always economically feasible. But at the same time it has become clear that direct railway connections which do not require changing trains have a much higher acceptance among passengers. The Spanish railway vehicle manufacturer CAF supplies RENFE with a series of high speed trains. This includes vehicles of the 120 and 121 series, which can run on both gauge systems and with both contact line voltages.

A particular highlight of these trains are the BRAVA bogies from CAF, which allow the train to be regauged within 1 minute and without stopping.

The high speed trains delivered to date with variable gauge widths are still limited to speeds of 250 km/h on the normal-gauge high speed network and 220 km/h on the wide-gauge RENFE network. Future versions will not be subject to this limitation.

SMA is currently developing a MEE-NT onboard converter with a total output of 300 kVA for this new generation of high speed trains. The device will have a medium-frequency potential separation and thus will be substantially lighter than comparable devices produced by competitors. Testing of the onboard converter will start in the summer of 2009.

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Bottom left:

RENFE 120
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Top:

Impressions of Spain