

CONSTRUCTION OF THE NEW LGV-EST HIGH SPEED CONNECTING CENTRAL EUROPE

SNCF began developing the French network of high speed railways in the early 1980's, radiating from Paris. The Sud-Est route to Lyon opened in 1982, followed by the Atlantique Lines to West and South-West France, the Nord-Europe line running to Lille, Belgium and the Channel Tunnel, and extensions taking Sud-Est trains all the way to Marseille. Réseau Ferré de France (RFF) is now the owner of all the national railway network. This new state company is in charge of the construction of the HSR to the East, well known as LGV-Est.

TGV is not only about fast trains - speeds can only be safely achieved when running on specially designed tracks. Existing tracks must be replaced with new tracks known as LGV (Ligne à Grande Vitesse). Although the design of the TGV train does allow it to run on existing tracks, it cannot achieve its full speed. Whilst not all main-line tracks have been re-laid, some have been upgraded to enable higher speeds (up to 220km/h), without the cost of totally relaying the track.

The proposed LGV-Est (Ligne à Grande Vitesse) has been under discussion since the

mid-1980's, with regards to the best route, and financial viability of construction, given that the line was unlikely to carry as much traffic as other lines under consideration at the time.

Finally in 1999, the French Infrastructure owner, RFF, received permission to construct a 300km line running from Vaires, on the Eastern suburbs of Paris to Baudrecourt near Metz and Nancy, Phase 1 of the new LGV. Construction is being financed by the local government authorities and regions, with contributions from the French State, EU, Luxembourg, RFF and SNCF.





As far as journey time is concerned, with the first phase of the project up to Baudrecourt spectacular reductions are possible by June 2007: Paris to Reims from 1h:33mins to 0h:45mins, Paris to Luxembourg from 3h:37 mins to 2h:15mins, Paris to Strasbourg from 3h:52mins to 2h:20mins, Paris to Frankfurt am Main from 6h:19mins to 3h:45mins, Paris to Stuttgart from around 6h to 3h:45mins and Paris to Zurich from around 6h to 4h:30mins.

Civil works for Phase 1 of the East LGV should be reasonably straightforward - the

route crosses hills, and does not require bored tunnels, however in Phase 2, between Baudrecourt and Vendenheim, the line crosses the Vosges mountains between the Moselle Valley and Alsace Plain.

The route of the East LGV, with its layout, bends and geometry has been designed by Réseau Ferré du France (RFF) to enable trains to reach a speed of 350kph. When it is brought into service in June 2007 the LGV Est will run commercially at a speed of 320kph, making the HSR to the east France's fastest train. To run safely at this speed, their position on the line and their speed have to be known at all times and there must be a means of communicating with them. The LGV Est will therefore be fitted with the very best electronic and telecom equipment. In addition to the French traditional signalling system known as TVM 430, it has a technological innovation known as the ERTMS (European Rail Traffic Management System), a string of letters used to show that Europe's rail network of the future is already under construction today.

train is on the track. The data, which is essential for traffic safety and flow, is transmitted by cable. Once the control room receives the information, it is analysed and the controller sends the train back its maximum operating speed. This means that if a train stops between stations, all the other trains coming up behind it are informed.

Thanks to ERTMS, which is being developed throughout Europe, the aim is to enable trains run by any European operator to travel on the LGV Est system. In this new system the data is transmitted by optical fibres and microwave connections using GSM-R (a special GSM for railways), and is currently being developed by RFF, SNCF, the installation contractor, and their European counterparts. The aim is to make rail networks in France and neighbouring countries compatible, or 'interoperable'.

As soon as the LGV Est comes into service it will use both systems working in parallel. In 2007, SNCF's high speed trains will use one or other of these two signalling systems and GSM-R radio.

There are other technical developments provided by LGV Est, all of them synonymous with progress and quality. For example, the PANDROL FASTCLIP rail fastenings already widely used in other countries will replace the traditional 'screw in' clamps.

The FASTCLIP fastening is slightly elastic,



DETECTING THE PRESENCE OF TRAINS

At present, high speed trains 'feel' the rail thanks to the train's wheels which 'short out' a low voltage current in the rail circuits. It is this that tells the control room exactly where the

ensuring perfect contact between rail and sleepers. Thanks to this product, coupling torque can be regularly inspected by video, cutting the costs of maintenance in the long term without any risk whatsoever. For the same reason the new link will use grease-free points and switches, installed CCTV or intelligent sensors and carry out ad hoc testing of track assemblies on single block sleepers or concrete platform.

TRACKWORK

On French high speed lines and the CTRL, equipment for tracklaying and catenary erection is mostly brought to worksites by rail. On the LGV Est three bases were established. The first, at Vadenay/Saint-Hilaire (Marne area) became operational in October 2004. The Ocquerre base (Seine et Marne area) officially opened its gates on 31st March 2005,

and in May 2005 it was the turn of Pagny-sur-Moselle (Meurthe et Moselle area).

The LGV-Est is a double track line, using twin-block concrete sleepers with PANDROL FASTCLIP fasteners.

The margin of precision when laying the tracks is 5mm. The traditional way for the tracklaying to progress is as follows:

- Temporary track is laid, which carries the wagons transporting the rails for the permanent track - it is made up of recovered rails and wooden sleepers.
- Rails are delivered. These rails can be up to 400 metres long. For each track, the rail is first unloaded, then the twin block concrete sleepers, pre-assembled with PANDROL FASTCLIP fasteners, insulators and rail pads, are put into position on the bed. The rail is then threaded into the rail seat, and mechanically fixed in place by the elastic

fasteners - the FASTCLIP that will be used for the first time on a French HSR.

- 5,000 tonnes of ballast is transported each day by rail and is unloaded on each side of the rail. Coarser, harder and more solid on an HSR than on traditional tracks, it will be changed every 25 years.

Tracklaying is advancing at a rate of 600 metres of double track each day (over 5,000 tonnes of ballast, 2,000 sleepers, 8,000 FASTCLIP fasteners, and 2,400 m of rails being the daily requirements for this).

Detailed pre-project studies of the second phase of LGV-Est, between Baudrecourt (Moselle) and Vendenheim (Bas-Rhin) have been completed. In the Bas-Rhine departement, second phase parcel surveys have taken place, acquisition negotiations have commenced and the regrouping procedures are on course. ■

