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L'Italie investit pour la grande vitesse et l'amélioration des capacités.

Italy invests for high speed and improved capacity

❖ Ken Cordner

The high profile high-speed rail network taking shape in Italy is part of a major investment in the capability of the whole rail network

Italy is set to have a new high-speed rail network of over 1,100km by the end of the decade – but major improvement to the existing network is also in progress, under the direction of RFI (Rete Ferroviaria Italiana). This is the infrastructure company within the Ferrovie dello Stato (FS – State Railways) group which is entrusted with investment of more than 100 billion euros over five years.

Originating in the 1998 restructuring of FS, and set up as an independent entity in July 2001, Rete Ferroviaria Italiana is responsible for designing, operating and managing the national railway infrastructure; maintaining safety and efficiency, and developing technology. RFI issues safety certificates to train operating companies licensed by the Government, plans train paths and markets access to the infrastructure.

TAV (Treno Alta Velocità SpA) is the high-speed line project company set up in 1991. Owned exclusively by FS since 1998, TAV has been controlled 100% by RFI since 2001 and has the dual role of contractor for RFI and client for other parties involved.

The high-speed network will cover the most important transport corridors, from Turin to Venice and from Milan to Naples. 630km of route between Turin, Milan and Naples (with 14km between Padua and Mestre) are under construction, while 270km between Milan and Padua and between Genoa and the Po Valley (via the Terzo Valico – third pass) are at the design stage. Studies of new routes towards Calabria and Sicily, and between Messina and

Contractors

General contractors were assigned responsibility for planning and implementation of the high-speed lines in 1991-92, but some changes have taken place, and the urban junction sections have been assigned through international calls for tenders.

The consortia are made up as follows:

Rome-Naples

IRICAV UNO (includes: Ansaldo Trasporti - Sistemi Ferroviari; Astaldi; Consorzio Cooperative Costruttori; Fintecna; Soc. Italiana per Condotte d'Acqua; Vianini Lavori)

Bologna-Florence

FIAT (Consorzio CAVET) (includes: Consorzio Ravennate di Produzione e Lavoro; FIAT Engineering; Impregilo; Cooperativa Muratori e Cementisti)

Milan-Bologna

CEPAV UNO (ENI) (includes: Aquater; Consorzio Cooperative Costruzioni; Grandi Lavori Fincosit; Impresa Pizzarotti & C; SnamProgetti; Saipem)

Turin-Milan

FIAT (Consorzio CAV.TO.MI.) (includes: FIAT Engineering; Impregilo; Società Italiana per Condotte d'Acqua)

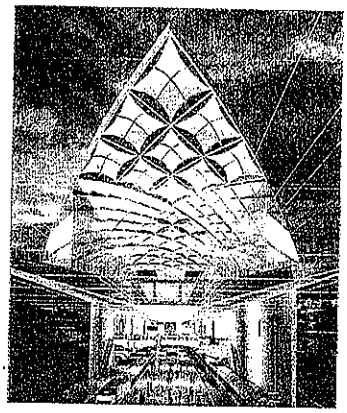
Milan-Verona

CEPAV DUE (ENI) (includes: Aquater; Ferrocemento Recchi [Condotte d'Acqua]; Fioroni Ingegneria [Garboli-Conicos]; Maltauro; Saipem; SnamProgetti; Todini Costruzioni Generali)

Milan-Genoa

COCIV (includes: Collegamenti Integrati Veloci; CER fra le cooperative di Produzione e Lavoro; Impregilo; Tecnimont; Ferrocemento Recchi [Condotte d'Acqua])

Palermo, have also been taking place, and the original 250km Rome-Florence high speed route – the Direttissima – is undergoing improvements to civil works, track, traction equipment, signalling and telecommunications. Reorganisation of urban interfaces between new and existing lines is a key aspect of the high-speed project.



Timescale and costs

The high-speed line strategy has seen radical change in recent years, substantially modifying the original design solutions. National policy changes and problems that emerged during implementation (archaeological finds, delays in authorisation procedures or additional variations to routes requested by local authorities) have had significant effects both on costs and timescales.

Redesign has aimed for integration with regional and urban railway systems and the environment, so that TAV sees construction of the high-speed lines as a project for upgrading the Italian railway system as a whole, for passenger and freight transport, for developing local transport, and for the mobility of the country in general. High-capacity is bracketed with high-speed in describing the new routes, which will provide much needed relief to the existing network and have seen design modifications to enable freight trains to use them.

The expected investment for the entire Turin-Milan-Naples line is 28,792 million euros. The financing scheme established between RFI and TAV has been under review, but provides for 40% of funding by the state through RFI and 60% by the capital market. RFI must also pay interim interest on loans. After start-up of each section, RFI will pay TAV for use of the railway.

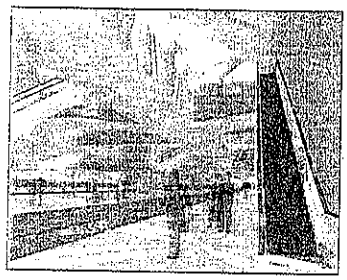
Under construction

Rome-Naples

The 205km line follows the A1 motorway for much of its length and will be linked to the existing network by 21km of interconnections. Work began in 1994 and had reached 85% completion, equivalent to 2,819 million euros, in 2002. The line is to be the first to open with European Rail Train Control System Level 2 signalling, developed by Ansaldo and Alstom. It has 25kV electrification, the first in Italy where 3kV is the norm.

In 1999, approval was obtained for a variation to the last 14km of the route into Naples, and for inte-

gration of the high-speed line with the Campania region's transport system, including Naples Afragola station, changes to the existing Cancello-Naples line and extension of the Circumvesuviana line to the new station. Work began in 2002 on a connection to link the new line to Naples Central using the existing Rome-Formia-Naples line.



Florence-Bologna

Crossing the Apennines, the route extends for 78km, including 73km in tunnels. Work began in 1996, except for the Florence end, which was approved in 1998 with work beginning a year later. 63% completion was reached in 2002, equivalent to 2,029 million euros. Tunnel excavation was 77% complete.

Milan-Bologna

The new route will run as far as possible alongside other existing or planned infrastructure. Of the route length of 112km, 17km will be in bored or cut-and-cover tunnels. The line will be closely integrated with the existing system through 21km of interconnections for passenger and freight traffic.

When the new line is opened in 2010, the travelling time between Milan and Verona is to be cut from 1 hour 21 minutes to just 43 minutes and the number of trains increased from 154 to 348.

Turin-Milan

The 125km route will have three interconnections with existing railways, including one which will serve Malpensa airport near Milan.

It is planned to conclude work on the Turin-Novara section in time for the 2006 Winter Olympics which will be hosted by Turin and for which the Malpensa link is important. March 2002 saw construction activity inaugurated on this first, 87km section which runs close beside the A4 motorway. Over 30km of noise barriers, 350 hectares of landscaping and more than 30km of new roads will serve to mitigate the impact of the works.

Urban integration

Major work is being carried out to take the high-speed rail lines through urban areas.

In Bologna, the urban section of the new line extends for 18km, more than half of which is underground, and is complemented by the extension of Bologna Central station with a new underground station. There will be interconnections with the Padua-Venice line and the line to Verona.

Florence's urban section of new line extends for 7km underground. A new below-ground central station will be linked with the existing Santa Maria Novella terminus. A Norman Foster / Ove Arup grouping won an international design competition for the new high-speed station, from ten shortlisted international designers.

The 10km urban section of new high-speed line in Rome follows the current Rome-Sulmona line and A24 motorway into the city from the east. Trains will be able to use Termini station, alternatively north-south through trains will be able to use a new Tiburtina station.

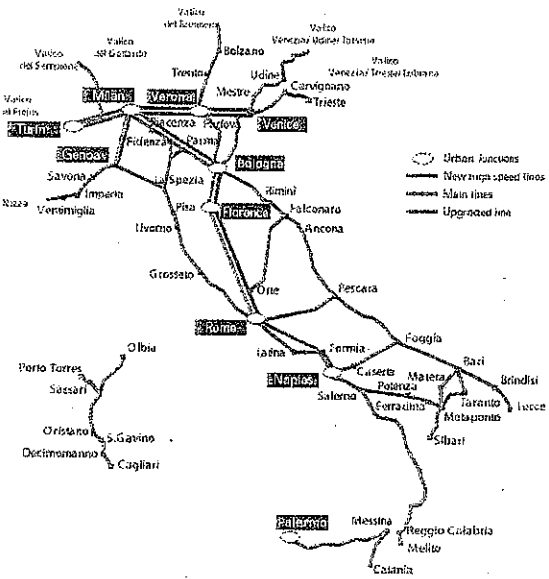
Italferr

Italferr, the engineering consultancy company owned by FS, operates in the domestic and international marketplace for transport engineering services.

With annual revenue of about 150 million euros, Italferr is playing a strategic role in the upgrade and development of Italy's railways – overseeing engineering design, tender management and construction management – as well as winning major orders on international markets.

The company has expertise in traditional, high-speed and urban transport systems, and in all other transport and complementary engineering sectors.

Italferr is responsible for upgrading and renewing the Italian main line network to the latest technology and safety standards, and integrating it with the high-speed system.



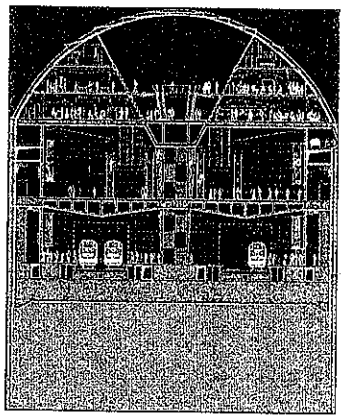
In Naples, the urban section has a total length of about 6km. Trains will be able to use the Central station or continue towards Salerno, Battipaglia, and Reggio Calabria with a stop at the new Naples Afragola station.

Upgrading

Capacity improvement on key parts of the existing rail network is another priority for RFI, with new routes for freight around major cities designed to release capacity for suburban passenger trains. Major resignalling schemes, doubling of single-track routes, and upgrading of secondary lines are also under way to improve capacity.

New Florence station

The new below-ground station in Florence will be built in the Belfiore area and will extend over more than 45,000 square metres. It involves an investment of about 240 million euros.



The complex, which will provide access to the high-speed line passing underground through Florence, will become the main metropolitan and regional interchange hub. It will be connected to Santa Maria Novella station and the historic centre of Florence by a new tram line and local trains.

Besides Florence, new stations will be built in Turin, Rome, Bologna and Naples, where the projects will be assigned to the world's leading architects through international design competitions. FS believes the city stations serving the new high-speed rail lines are the most important public infrastructure currently under construction in Italy, and have given FS the opportunity to return to a tradition of promoting major architectural works.

The Florence design features a large glass roof supported by a lightweight steel structure intended to be reminiscent of nineteenth-century 'train sheds'. The roof has a multilayer system, with variable-structure diaphragms to assist environmental and acoustic control, natural lighting, changing of air and removal of fumes.

The interior space is completely open vertically, making the trains visible from above ground. Following routes marked by varying natural and artificial light, escalators and moving walkways connect the platform level (25 metres below street level) with the ground floor which contains all the station ser-

vices, restaurants, shops, and exits to bus terminals, trams, taxis, car parks and regional train platforms.

Work on the new station is scheduled to start in 2005 with completion by 2009.

Other new stations

Naples Afragola

The international design competition for the new station at Naples Afragola was opened earlier this year. The new station will occupy an area of 20,000 square metres, with scope for extending it by a further 10,000 metres. It will handle over 300 trains per day, and a flow of approximately 33,000 passengers per day, with an average of about 5,000 at peak times. There are also plans to build a technological and nature park and exhibition centre nearby. Work is expected to be completed in 2008, at an estimated cost of 70 million euros.

Rome Tiburtina

The new station at Rome Tiburtina is part of an extensive urban development initiative (over 92 hectares) agreed between the municipal administration and FS. The project will reconnect two districts – Pietralata and Nomentano – which have historically been separated by the railway. The station, which has been conceived as a large overhead gallery, will have a covered, raised boulevard straddling the track. The development will be completed with the creation of 10 hectares of parkland.

The winning design in an international competition is by Paolo Desideri, heading an extensive international group. Work is expected to be completed in 2005, at a cost of approximately 100 million euros.

Turin Porta Susa

The new station at Turin Porta Susa forms part of a redevelopment which involves constructing a railway corridor, increasing the existing number of tracks by four and taking them underground, and creating a tree-lined boulevard above the tracks, which will reconnect two previously separated districts of the city. The winning design in an international competition was produced by the French architecture group Arep. Work is expected to be completed in 2007, at a cost of 40 million euros.

Bologna

Restoration of the existing station will be supplemented by a new high-speed station, which will be 24 metres below the current tracks, divided into three levels.

ARCHIMEDE diagnostic train

RFI's new ARCHIMEDE infrastructure diagnostic train, developed by Mer Mec SpA, is akin to the Doctor Yellow train developed in Japan. The 150-metre long ARCHIMEDE train is reckoned to be the most advanced measuring train in Europe, and is designed to work at up to 220 km/h. ARCHIMEDE can measure all the basic infrastructure parameters, enabling it to correlate them and to carry out advanced analysis on infrastructure deterioration – a basic requirement of 'on-condition' maintenance.