Initiation of High Speed Railways in Europe

Roman Štěrba

The article describes initiation of high-speed railway network and services in Europe. Potential of high-speed railways leads the European Community to rediscover the virtues of rail as a cost-efficient, environment-friendly transport alternative to airways and highways. Long considered a sector in decline, rail has re-emerged as a growth sector.

Key words: railway, high-speed, network

Introduction

Common Transport Policy is a crucial component of the EU’s Single Market. Major strides in the development of high-speed railways in Europe galvanize interest in the integrative potential of the high-speed railway services. Plans for establishing a high-speed network include extension of some 35,000 km, of which 20,000 km are new dedicated tracks. While high-speed trains shall connect all continental EU Member States and Britain, common high-speed network with new tracks with speed over 250 km/h shall interconnect crucial EU areas. In this year, segments of a high-speed network are set to open in six countries across Western Europe.

Length of HS Lines over 250 km/h (km)

![Chart showing the length of high-speed lines over 250 km/h in km at the end 2004](chart)

Schema 1: Length of high speed lines over 250 km/h in km at the end 2004 [2]

---

1 Dr.Ing. Roman Štěrba
Czech Technical University in Prague, Institute for Steering of Transportation Processes and Logistics.
Adviser to the Deputy Director General for Economics, Czech Railways. E-mail: SterbaR@gr.cd.cz
Chairman of Financial Indicators Working Group, International Union of Railways (UIC), Paris

---

261
High speed network

Priorities in planning, development and funding of a high speed network are established in a series of reports beginning in the 1980s. In late 1990, following a formal Commission proposal, the EC Council of Ministers established an action programme designed to complete the Single Market in European transport. One of its five objectives is ‘the provision of high-quality links between the major urban centers, including high speed links’. This act established the notion of ‘Declaration of Community Interest’, which opens the door to EU funding of projects considered essential to the Community as a whole. The unexpected financial and social success of TGV (train à grande vitesse) helped attract international attention to rapid rail as both a hi-tech and a solid component of transport infrastructure. Europe’s emerging high speed network combines new lines built over the past 20 years with conventional routes upgraded for 160 km/h or 200 km/h operation. Studies show that high speed links maximize profitability in medium distance (200-500 km) travel, requiring:

- large population density at either end.
- high existing market demand based on current and projected traffic flows.
- journey times of under 3-4 hours duration (beyond which they can no longer compete successfully with airlines for business passengers).

High speed lines may indirectly facilitate the flow of goods, by freeing up more regular rail capacity on conventional lines. The effect of high speed railway will be to increase the flow of international passenger traffic bringing a visible and direct beneficiary to the increased mobility of the Europeans, even if the majority of that still serves the domestic markets.

Social viability of high speed railway is based on two arguments. One is that a high speed railway will draw peripheral regions closer to the EU’s geographic, political and economic centre. This is especially crucial for peripheral regions where the main impetus for development will have to come via political initiative rather than existing economic demand. Another social argument in favour of high speed railways is that they serve the public interest as an environmentally sound alternative to road or air travel.

Length of HS Lines over 160 km/h to 250 km/h (km)

Schema 2: Length of high speed lines over 160 km/h to 250 km/h in km at the end 2005 [2]
High speed rolling stock
Actually, the top European high speed trains are designed to operate at up to 350 km/h in commercial service. They include French TGV POS for 320 km/h, German ICE 3 for 330 km/h and Siemens’ class 103 for Spanish RENFE for up to 350 km/h.
Investments in expensive high speed rail lines are really only justified for links with very heavy traffic flows. Despite it, new lines are difficult to obtain in some areas (densely populated ones, sensitive cultural or natural environments). Fast train technology, geared for substantially higher speeds on conventional main line tracks, involves the application of active (Fiat) or passive (Talgo) carbody tilt technology for increased passenger comfort in curves by means of compensation of lateral acceleration and soft suspension bogies (ABB). In case of soft suspension bogies, the key importance lies in bogie design featuring reduced dynamic forces. As opposed to traditional bogies, this ABB’s concept allows wheel axles to respond to curves and achieves 40% higher speed through curves.

Carriage by high speed trains
European high speed traffic has tripled in the space of ten years. Market share increased strongly, with the situation completely overturned in some markets. For journey times up to 2 1/2 hours, rail’s share of the rail/air market is over 75%, with 50% up to 4 hours. 18 million passengers used the TGV Méditerranée in its first year of operation:
- traffic levels up 35% in 2000
- load factor of 75%
- 90% of trains on time in May 2002
- 61% market share in relation to air (compared with 40% in 2000).
A recent study Étude Trafic Passagers 2010-2020 [3] reveals that by 2010 high speed will have gathered an extra 51 billion passengers-km, two thirds of which will have come from other transport modes.

Schema 3: Passenger-km (Bill.) in high speed trains in Asia (left bar) and Europe (right bar) [2]
Conclusion

Development of high speed railway offers intriguing possibilities for successful commercial application of advanced technologies, which would increase the transport alternatives and convenience for millions of Europeans. Its integrative potential is determined by implementation of technical standards of interoperability and high development costs. Instead of traditional neglect of railways, high speed rail can help the EU endeavour to maximize the advantages of the Single Market.

Literature


Schema 4: Development of high speed rail traffic in Europe (Bill. Passenger.km) [2]