

JAPAN Railway & Transport REVIEW

Special Feature

30 Years of High-Speed Railways

Japanese Railway History 3

Growth of Independent Technology



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East Japan Railway Culture Foundation
6-5, Marunouchi 1-Chome, Chiyoda-ku, Tokyo 100, Japan
Tel. (81 3) 3213 8310. Fax (81 3) 3213 3018
Chairman: Dr. Shoji Sumita
Vice-Chairman: Hideaki Kinoshita

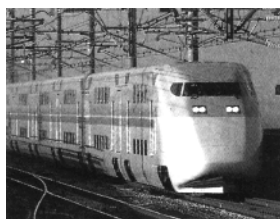
Chief Editor:
Tatsuhiko Suga, Executive Director, EJRCF
Editors:
Mami Aoki, Senior Researcher, Institute of Transportation Economics
Makoto Ito, General Manager, Study and Research, Japan Transport Economics Research Centre
Kentaro Egawa, Assistant General Manager, Technical Development & Research Department, East Japan Railway Co. (EJR)
Tosh Hirose, Assistant General Manager, Management Administration Department, EJR

Head of Editorial Secretariat:
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■ Series E1 MAX on Tohoku Shinkansen (H. Morokawa)

Editorial

High-Speed Trains — How Fast and How Far?

How fast can a high-speed train go? In May 1990, a TGV test train reached a top speed of 515.3 km/h. This is a striking record for a rail-wheel system with passengers on board, although it fell just short of the 517 km/h reached by an unmanned Japanese magnetic levitation vehicle in 1979. However, the TGV's successful run at more than 500 km/h does not necessarily mean that regular commercial services at such a high speed are technically or economically feasible. Towards the end of this century, the maximum speed of commercial trains may come close to 350 km/h. But even a marginal increase beyond that speed will require overcoming enormous technical problems including stabilising bogie movements, preventing track damage caused by high dynamic forces, maintaining contact between the overhead wire and pantograph, etc.

Germany and Japan have both developed magnetic levitation systems. Their experiences suggest that magnetic levitation is technically feasible, but the main drawback is the lack of compatibility with the existing rail infrastructure. The French TGV has shown that a new high-speed line well integrated into the existing rail network can generate enormous new demand and benefits. The problems of the Japanese shinkansen caused by the different gauge from the conventional network tell the same story in a different way.

The rail-wheel system will therefore remain the basis of main networks. Although the maximum speed may remain at around 350 km/h, high-speed trains will play an increasingly important role in the field of passenger transport over distances of 300 to 1,000 km, where they compete effectively with road and air transport. This is the best solution to cut congestion on motorways and at airports, and to protect the environment.

How far can the high-speed rail network be expanded? Raising funds for the heavy initial investment, and repayment are not easy tasks. Even populous Japan faces difficulties after the 1,800-km shinkansen network reached most of the densely-populated and highly-industrialised regions. In this sense, the master plan of the European high-speed rail network with 9,000 km of new lines and 15,000 km of upgraded lines seems too ambitious. In North America, where the only modes of passenger transport available for most of the population are the car and the aeroplane, even forming a national consensus to build a high-speed rail network will be difficult.

Greater potentials for high-speed trains lie in some Asian countries. They have many densely-populated intercity corridors with rapidly-growing economies, and their technology and industrial capability are improving very fast. Transport demand in China is growing fast, but for China's car ownership to reach the same level as the USA, they would need more than 700 million cars. The entire world today has only about 440 million cars! The future transport system in Asia is therefore of vital importance to the rest of the world. Some countries are keen to sell only their high-speed products to Asian countries, but we must understand the real significance of the issue for the future of mankind.

[T. SUGA]

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