



Newsletter on the
Latest Technologies
Developed by RTRI

Railway Technical Research Institute
2-8-38 Hikari-cho, Kokubunji-shi
Tokyo 185-8540, JAPAN
URL: <http://www.rtri.or.jp>

Editorial Office: Ken-yusha, Inc.
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Research and Development for Sustainable Evolution of Railways

Norimichi KUMAGAI
Vice President

After starting revenue service first in 1872, the railways in Japan are now in their 140th year. They have introduced knowledge and know-how from the United Kingdom, France and the US on railway technologies and management in abundance in terms of human and physical resources. With this knowledge and the wisdom of Japanese engineers, Japan has constructed a nationwide railway network tailored to be in harmony with the specific geographical environment and transport demands of the country. These efforts bore fruit such as construction of the Shinkansen system to accelerate the social and economic development of the country. Unexpectedly, the Shinkansen system triggered the recognition that high-speed railways were of high value to the aforementioned pioneer countries in the railway industry.

A number of other countries are now discussing the construction of high-speed railways that combine high-speed performance and large transport capacities to rival those of airplanes as a basic infrastructure of the nation. These countries recognize the efficiency that high speed railways bring to inter-city transportation, while recognizing the merits of small amounts of CO₂ emission. It is no exaggeration to say that the unprecedented safety of the Shinkansen system has been supported by the research and development continued for 45 years, before and after the start of revenue service. The distressing experience of system trouble in the past gave railway operators the impetus to further improve the safety of Shinkansen. For instance, the Hanshin-Awaji Great Earthquake in 1995 collapsed part of Shinkansen bridge piers, which motivated railway operators to implement reinforcing work for the viaducts of the nationwide Shinkansen network. At an earthquake in 2004, a Shinkansen train was derailed. With this incident as a momentum, railway operators now positively promote measures to prevent the derailment and de-tracking accidents of Shinkansen cars. Due to these measures, Shinkansen structures were not seriously damaged by the Higashinohon Great Earthquake in 2011. The high-speed railways in Japan, which have repeatedly been re-engineered with various problems eliminated, are superior from the viewpoints of energy conservation, safety, reliability and other characteristics. With this experience, Japan will be able to support

various projects in other countries.

To respond to the requirements of the nation and the Shinkansen operating companies as a whole, Railway Techni-

cal Research Institute (RTRI) has been promoting widely ranged themes to upgrade the performance of the Shinkansen railway system. These include the improvement of safety, suppression of aerodynamic noise in high-speed operation, development of lightweight cars and systems to save regenerative brake energy, in addition to the evaluation of the safety related to man-machine interfaces.

I still remember that RTRI owes much to the cooperative relations with overseas railway sectors during the process of such research and development. Research at RTRI has been accelerated by the detailed discussions with the researchers of SNCF, China Academy of Railway Sciences, Korea Railroad Research Institute, Rail Safety and Standards Board in the UK, Southampton University, Cambridge University, MIT and other research organizations.

I suppose that the research results thus obtained shall be of benefit to railways of the world. The basis of research and development is to raise the knowledge level of human resources. If railway researchers meet together, stimulate each other and strengthen the will to undertake research and development, the potential success of railway technologies will continue to improve. Those who are addressing research and development in railway technologies should promote activities toward the sustainable development of railways in the world. We are sure to play our part in such a role in international circles.



Norimichi Kumagai