

RTRI Research and Development Projects Promoting Advances in Rail Transport

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When conducting research and development for future advances in rail transport, Railway Technical Research Institute (RTRI) promotes small-scale projects that target technical breakthroughs, aiming for the practical application of R&D results within approximately five to ten years. RTRI's master plan for the fiscal years 2005 - 2009, called Research 2005, envisages 12 R&D projects.

These projects were given the following themes:

- They should respond to the needs of companies in the JR Group, and to social trends
- They should aim for the development of advanced technologies and for improvements in rail transport
- They should take advantage of the strengths and R&D expertise that RTRI has in specific areas
- They should lead to the development of practical technologies, and the resolution of critical problems surrounding that development

Outlines of four major R&D projects and the titles of the other eight projects launched by RTRI in fiscal 2005 are listed below. All projects aim to promote future advances in rail transport.

- (1) Configuration and application of a signaling system evaluated with the RAMS index

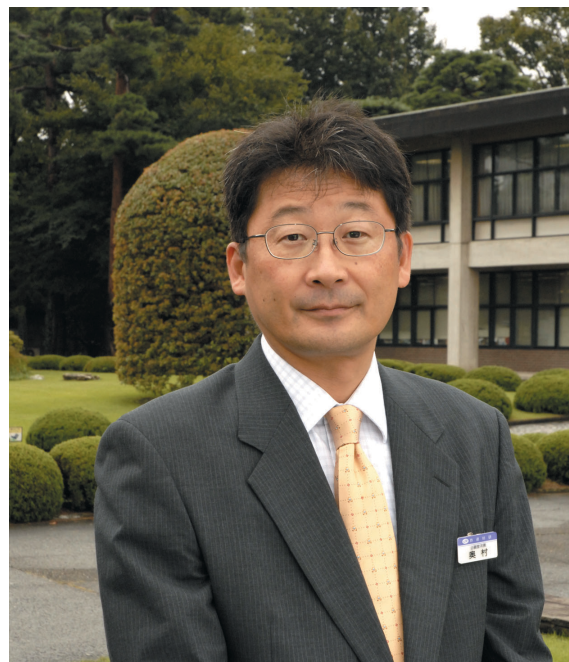
This project will study and propose methods for evaluating the RAMS (Reliability, Availability, Maintainability and Safety) characteristics of a signaling system, and methods to improve such evaluation indices, in order to effectively establish, at low cost, a signaling system having excellent RAMS characteristics.

- (2) Development of a method to evaluate the characteristics of vehicle dynamics, using a hybrid simulator

This project will develop a system that effectively evaluates vehicle characteristics using mainly Hardware-In-the-Loop (HILS) Simulation (HILS) techniques, symbiotically linking computer simulations, component testing equipment, and vehicle testing stands. HILS are hybrid in nature, using testing equipment that coordinates the use of computerized dynamic models with the simultaneous use of actual equipment, while transmitting their responses to a computer system.

- (3) Improvement in the evaluation of existing railway facilities' ability to withstand earthquakes, and development of better measures for making facilities more earthquake-resistant

Railway systems are composed of a wide variety of component parts, mainly structures, track, an electric power system, signaling equipment and rolling stock. Antiseismic measures have traditionally been applied to each of these individual component parts. In reality, though, each of these parts influences the others. RTRI's antiseismic research emphasizes this fact while developing (i) methodologies to evaluate, using common criteria, the behavior of railway



facilities during seismic activity, and (ii) methodologies to determine what type of earthquake-resistance measures should be implemented, taking into consideration quantitative factors such as investment cost effectiveness.

- (4) Development of human simulation technologies to improve safety and riding comfort

Simulation techniques have advanced rapidly and are now used to examine human factors such as passenger traffic patterns, behavior, and decision-making patterns. RTRI is building on these advances while developing new simulation techniques that can be used to better evaluate and predict the safety and comfort levels of passengers and railway personnel.

Titles of the other eight projects are as follows:

- (5) Application of IT and sensing technologies to equipment management
- (6) Development of a tool to predict rolling noise and structure-borne noise, and development of noise reduction measures
- (7) Development of high-speed mass storage information and telecommunication technologies for railways
- (8) More efficient transport planning based on dynamic demand estimation
- (9) Creation of rail damage/ballast track deterioration models, and evaluation of maintenance work saving technologies
- (10) Development of a new low-maintenance, low-noise track
- (11) Development of fuel cell vehicles
- (12) Application of linear motor technologies to the conventional railway system