Annual Report 2007

Railway Technical Research Institute

Katsuji AKITA
President

Foreword

Safety, Environmental Compatibility and Amenity

- Technologies to achieve higher service quality of railways -

As well as the globalized industrial technologies, economic activities and matters relating to the living environment accelerated in the 21st century. As part of this process, railway industries took steps towards globalization, especially in the fields of standardization of equipment and systems. In some instances the industry became more specialized, while alliances were set up across the industry. At the same time moves were made towards achieving interoperability of train services. We are also now witnessing a railway renaissance in which railways are being re-evaluated not merely as the social infrastructure supporting economic development but also as the mode of transport which has excellent advantages in terms of being environmentally friendly across the globe.

I think that the following are key issues to establish or promote the sustainable development of railways. (1) Safety: reducing the risk of accidents and natural disasters; (2) Environmental compatibility: increasing energy efficiency; and (3) Amenity: increasing train speeds, achieving seamless transport and improving the quality of services by providing definitive information and guidance to customers.

The Railway Technical Research Institute is an integrated research organization whose history dates back more than 100 years and which today is staffed by more than 500 research engineers. We are conducting R&D on railways in order to contribute to various activities in the growth of not only Japanese but world railway networks. Our work ranges from fundamental research to practical technology developments and, furthermore, the development of innovative systems looking ahead several decades into the future with a strategy to improve the safety, environmental compatibility and amenity of railways. To fulfill our targets, we are intensively promoting joint research projects with both domestic and overseas universities and research institutes in order to exchange technical knowledge not only with railway related organizations but with a broad range of industries.

HighSpeed 2008

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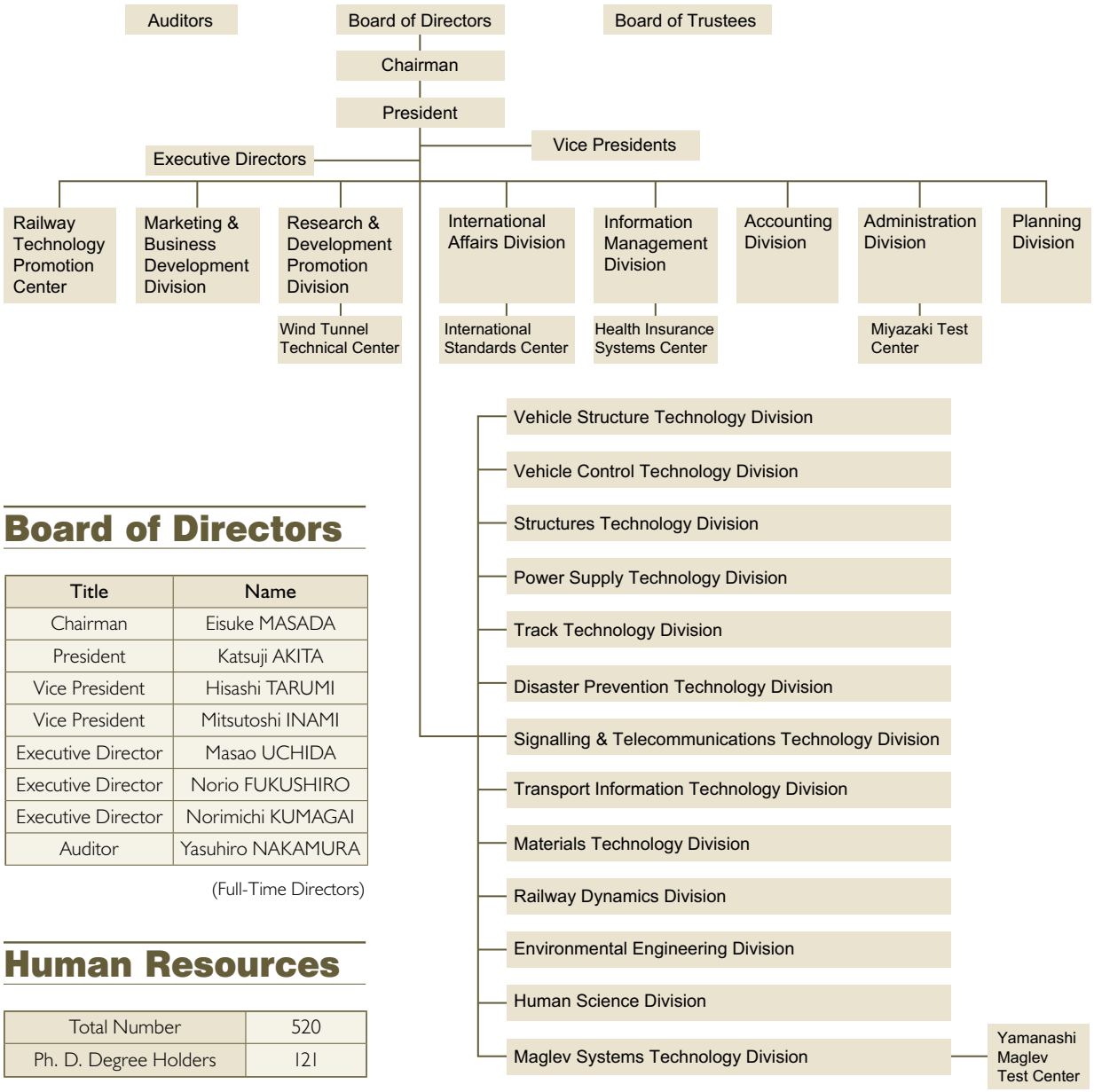
Organization

Organizational Structure



Board of Directors

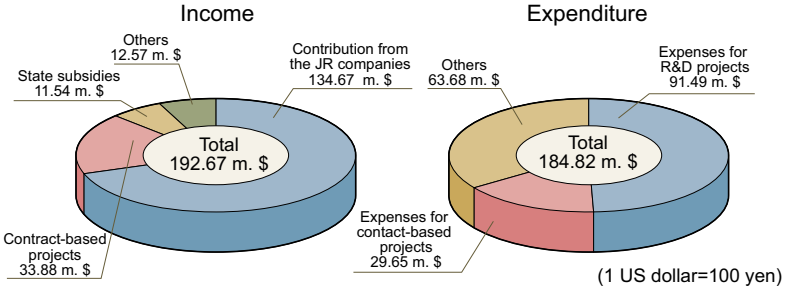
Title	Name
Chairman	Eisuke MASADA
President	Katsuji AKITA
Vice President	Hisashi TARUMI
Vice President	Mitsutoshi INAMI
Executive Director	Masao UCHIDA
Executive Director	Norio FUKUSHIRO
Executive Director	Norimichi KUMAGAI
Auditor	Yasuhiro NAKAMURA

(Full-Time Directors)

Human Resources

Total Number	520
Ph. D. Degree Holders	121

Income and Expenditure in FY 2007



(1 US dollar=100 yen)

Number of Projects

FY 2007

Category	Number
R&D for the Future of Railways	49
Development of Practical Technologies	151
Basic Research for Railways	84
Standards/Surveys	14
Total	298

Master Plan of the RTRI (RESEARCH 2005)

The RTRI has carried out its R&D activities based on master plans prescribing basic policy. From FY 1999 to 2004, it operated under the master plan *RESEARCH 21*. From FY 2005, the RTRI started to operate its R&D activities based on the new five-year master plan *RESEARCH 2005* formulated in consideration of the progress of R&D over the previous five years and changes in the circumstances surrounding railways.

Outline of the Master Plan

1. Background

In formulating the master plan, the following background conditions were considered:

Society and Economy

In the long term, the Japanese economy's period of low growth is expected to continue despite the trend of recovery shown in recent years.

The tendency of declining birthrate and the growing proportion of elderly people will accelerate.

Information and telecommunication technologies are rapidly progressing to form a high-level information network society.

The global environment is now a matter of primary concern among people.

Transportation

A decline in the number of railway passengers is expected due to a decrease in the production-age population.

Competition with other transportation modes is intensifying.

Demand for intermodal transport is increasing among railway users.

JR Companies and Other Research Organizations

JR companies and other railway operators are actively addressing environmental issues.

National universities and government-affiliated research institutes have become independent administrative institutions, enabling a tidal shift in the role of R&D in the country.

The RTRI

A new fundamental policy for R&D on the magnetically levitated railway system is required.

2. Fundamental Policy on R&D Activities

Based on recognition of the current situation and the predictions described previously, the RTRI established a fundamental policy on R&D activities as follows:

1. Create railway technologies for the 21st century.
2. Demonstrate integrated power as a group of railway engineering experts.
3. Respond quickly to needs.
4. Hand down railway technologies and accumulate basic expertise.
5. Disseminate railway technologies and transmit railway-related information.

Based on these policies, the RTRI will work hard to live up to the expectations of JR companies and various other industries.

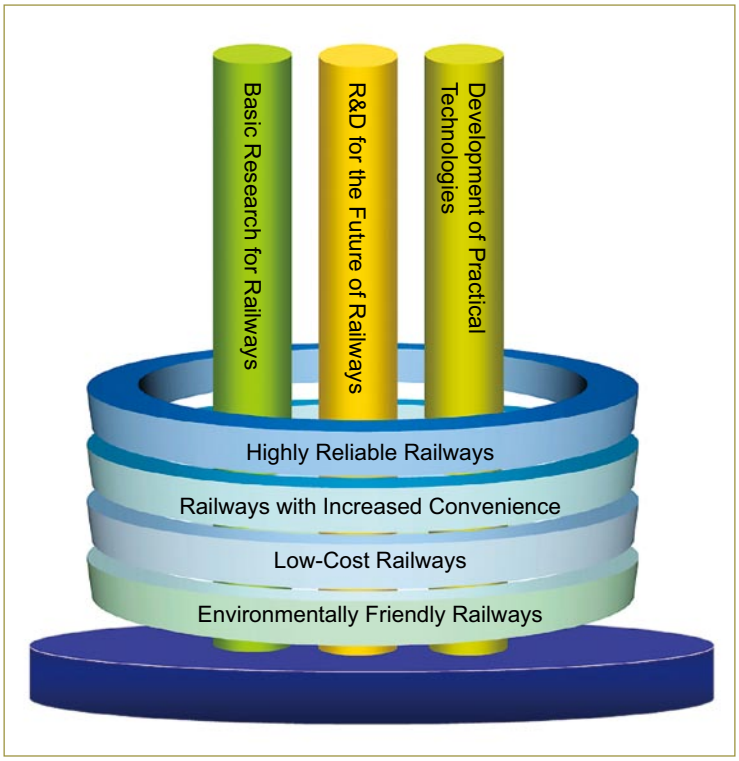


Fig.1 Basic Concept of R&D Activities at the RTRI

3. R&D (Research and Development)

(1) Basic Concept of R&D

The RTRI will concentrate its power to promote effective R&D activities. For this purpose, it set up *Targets of R&D*, which show the directions of R&D activities, and *Mainstays of R&D*, which clarify the fundamental categories of R&D (see Fig. 1).

(2) R&D Plan

[Targets of R&D]

The RTRI set up the following *Targets of R&D*:

1. Highly reliable railways (for safety and stability)
2. Railways with increased convenience (for rapidity, convenience and riding comfort)
3. Low-cost railways (for economy)
4. Environmentally friendly railways (for harmony with the environment)

[Mainstays of R&D]

The RTRI set up the following three *Mainstays of R&D* in consideration of the importance of environmental issues, the development of information and telecommunication technologies, improvements in the reliability, convenience and riding comfort of railways, and the reduction of costs in railway businesses:

1. R&D for the future of railways
2. Development of practical technologies
3. Basic research for railways

In the area of R&D on the magnetically levitated railway system, the RTRI will promote R&D activities mainly to apply the various accumulated technologies and know-how on superconductive magnets and linear motors to conventional railway systems. It will also conduct R&D to maintain the Maglev-related technologies required for this purpose.

(3) R&D for the Future of Railways

The RTRI promotes *R&D for the future of railways* as a collection of transversal study projects to bring about technological breakthroughs for future railways aimed at practical application within five to ten years.

Table 1 R&D Projects for Future Railways

Target of R&D		Project Title
Highly reliable railways	[Improvement of the safety of train running]	Configuration of a signaling system using the RAMS index and its application
		Development of a method of evaluating vehicle dynamic characteristics using a hybrid simulator
	[Stable transport]	Seismic evaluation and countermeasures for existing railway facilities
		Application of IT and sensing technologies to equipment management
Railways with increased convenience	[Much more convenient railways]	Development of a broadband communication technology for railways
		Efficiency improvements for transport planning based on dynamic demand estimation
	[Improvement of riding comfort]	Development of human simulation technologies to improve safety and riding comfort
Low-cost railways	[Reduction of maintenance costs]	Development of a model to predict rail failure and ballast track deterioration and evaluation of maintenance work reduction technologies
		Development of an innovative low-maintenance, low-noise track
Environmentally friendly railways	[Noise reduction]	Development of an analytical tool to predict rolling noise and structure-borne noise, and measures for noise reduction
	[New forms of energy]	Development of fuel cell rolling stock
		Application of linear motor technologies to conventional railway systems

The basic concepts set up for the projects are as follows:

1. Projects should respond to the needs of JR companies and social movements.
2. Projects should be pioneering and oriented toward future railways.
3. Projects should make full use of research areas in which the RTRI has a competitive edge or specific characteristics.
4. Projects should be reflected in the development of practical technologies or solutions for critical problems with such technologies.

The 12 assignments for projects set up based on the above concepts, whose research work started in FY 2005, are shown in Table 1.

(4) Development of Practical Technologies

To enable timely response to the diverse requirements of JR companies, the RTRI continuously promotes R&D projects, as in the past, that are designated individually by JR companies to solve local or on-site problems and that can be practically applied in the field.

The RTRI promotes contract-based R&D projects, not only with JR companies but also with various corporations, aimed at wide-ranging practical application of the research results.

The RTRI also promotes carefully selected self-directive practical R&D projects focusing on the engineering field, especially where it has a competitive edge or advantages in development, by using its own knowledge, know-how and special or unique test facilities.

(5) Basic Research for Railways

The RTRI promotes basic investigations to elucidate railway-inherent phenomena and to establish evaluation methods as *analytical research*; it also promotes investigations for the application of new technologies and new materials to railways as *probing and introductory research*. We recognize that this basic research should be conducted to germinate practical railway technologies or to serve as a foundation for them, and that such work is essential in solving a variety of railway-related problems.

For the magnetically levitated railway system, the RTRI promotes the development of durability test and performance evaluation methods for ground coils and superconductive magnets, as well as the necessary studies on a Maglev riding comfort evaluation method to maintain the technical ability required for application to conventional railway systems. The RTRI will also participate in running tests on the Yamanashi Test Line as a means of fulfilling the above R&D objectives.

4. Railway Technology Promotion Center (RTPC)

The RTPC will promote various activities based on the principles outlined below to solve the problems of its member corporations by understanding their common technological needs and to assure the reliability of railways overall.

The Center will make efforts to promote its usefulness by providing information, and will make the necessary proposals to the government so that the results of its activities will be reflected in government policies. The RTPC will also organize workshops and opinion exchange meetings to strengthen communications with members and enhance the transmission of information.

1. Maintenance and Improvement of Technological Capabilities
   (by conducting technological support and administering the Railway Design Engineer Examination)
2. Systematization of Technologies and Problem Resolution
   (by providing technical standards, conducting survey and research projects, and carrying out contract-based projects)
3. Technological Information Services
   (by providing information on technologies, safety and international standards)

5. Management

(1) Basic Concept of Management

Seventeen years have elapsed since the privatization of JNR; the RTRI is now facing a tide of generation change among researchers. To prevent technological gaps between the old and new generations, the RTRI pays particular attention to the transfer of technology to the next wave of researchers. The RTRI takes every conceivable measure to adopt and educate its human resources - the most important asset for any research institute.

(2) Securing and Training of Human Resources

The RTRI will systematically recruit new graduates mainly in the field of railway-inherent technologies. We will also invite experienced researchers who have excellent records in other research organizations. The RTRI makes efforts to secure adequate human resources through a variety of recruiting channels.

In the area of education and training for human resources, the RTRI will step up personnel exchanges with railway operators, including JR companies, and will develop researchers who are very familiar with the on-site activities of railways. We also dispatch our employees to domestic and overseas research organizations and universities to introduce or absorb new technologies and research techniques.

(3) Personnel Plan

The number of RTRI employees at the beginning of FY 2005 was 520. The RTRI continuously recruits employees needed for R&D on a priority basis, and plans to improve the efficiency of its management during the period of this master plan to reduce the number of employees to 510 by the beginning of FY 2009.

(4) Equipment Plan

The RTRI will invest funds in equipment directly related to R&D activities as a matter of top priority and update its test equipment, including the rolling stock test plant, which represents one of the advantageous features of the institute.

Major Activities in FY 2007

1. Activities Related to Test and Research

1.1 Test and Research Projects

The RTRI conducted 298 R&D projects in FY 2007, 137 of which were completed as scheduled. The following is an overview of the R&D results classified according to the three categories featured in the master plan *RESEARCH 2005*.

1.1.1 R&D for the Future of Railways

A total of 13 assignments were conducted, including 49 projects related to R&D for the future of railways.

(1) Highly Reliable Railways

a) Development of a method of evaluating vehicle dynamic characteristics using a hybrid simulator

- A prototype of a coupled carbody motion simulator was made to control the movement of two adjacent car ends; a simulation method was then developed using several computers collectively to control train set motion.

b) Seismic evaluation and countermeasures for existing railway facilities

- Standard earthquake motions were formulated based on recorded strong-motion data with respect to regions where inland near-field earthquakes or near-land large-scale interplate earthquakes are to be taken into consideration.
- The damage mode or pattern of tunnels subjected to earth pressure alternation was clarified in three-dimensional loading tests using 1/50 scale models.

c) Configuration of a signaling system using the RAMS index and its application

- Quantitative assessment was conducted on the effects of reliability improvement measures (including the simplification of wiring between components), and countermeasures were proposed to restrict accident occurrence frequency and mitigate the effects of train delays on passengers to within target levels based on the results of case studies.

d) Application of IT and sensing technologies to equipment management

- A prototype wireless data transmission system was made to communicate using sensors to detect the invasion of foreign objects into turnouts and sensors attached to railway structures, and its performance was verified.

(2) Railways with Increased Convenience

a) Development of a broadband communication technology for railways

- Communication tests were conducted between fixed points using an optical laser beam, and the feasibility of maintaining a communication rate of approximately 300 Mbps over a line-of-sight distance of about 1 km was confirmed.

b) Efficiency improvement for transport planning based on dynamic demand estimation

- A behavior selection model to predict passenger decisions on whether to wait for the resumption of train operation or take a detour was developed

based on the results of a questionnaire survey on passenger behavior during train operation disturbances. The predicted results were verified using automatic fare collection gate data that were highly correlated with passenger flow.

c) Development of human simulation technologies to improve safety and riding comfort
- Data on the relationship between working conditions and the heart rate of drivers were collected; a simulation program to predict the burden on drivers based on service conditions was developed.

(3) Low-Cost Railways

a) Study on performance improvement and streamlining of maintenance work for the current collection system
- A prototype system to measure contact forces from the contact wire side was made to evaluate the relationship between the wear of contact wire and pantograph contact force, and on-site measurements were started on a Shinkansen commercial service line.
- A prototype support structure was made to reduce the pulling-up of contact wire at support points to suppress local wear, and its effect on reducing contact force fluctuation was confirmed using test apparatus.

b) Development of an innovative low-maintenance, low-noise track
- Loading tests and rail creep resistance tests were conducted for an innovative track featuring a special rail-cross-sectional profile and a special fastening method, and the equivalence of the rail constraining strength and rail creep characteristics to those of existing tracks was confirmed.

c) Development of a model to predict rail failure and ballast track deterioration, and evaluation of maintenance work reduction technologies
- Prototype models were developed to predict the progress of ballast track settlement and quantitatively predict the propagation of rolling fatigue cracks and side-wear development.

(4) Environmentally Friendly Railways

a) Development of rolling stock powered by fuel cells
- Design of a chopper unit to conduct traction and charging control and development of a lithium ion secondary battery were conducted as essential elements in the hybridization of fuel cells and batteries. As a result, a battery with high charging and discharging performance was produced.

b) Development of an analytical tool to predict rolling noise and structure-borne noise, and measures for noise reduction
- Prototype analytical models to predict rolling noise using the roughness or unevenness of rails and wheels were developed along with a method of predicting structure-borne noise using the three-dimensional finite element method.

c) Application of linear motor technologies to the conventional railway system
- A prototype superconductive magnetic bearing combining superconductive coils and bulks that can continuously operate at 3,000 rpm with a supporting force of 5 kN was made to enable the development of a flywheel storage battery for railways.

1.1.2 Development of Practical Technologies

A total of 151 projects related to the development of practical technologies were conducted.

(1) Highly Reliable Railways

a) Study on the behavior of embankments in mountainous areas during disasters
- Shaking table tests under rainfall conditions were conducted; it was confirmed that the conventional countermeasure using reinforcing elements increases seismic performance by approximately 40%, and a simplified seismic performance evaluation method was proposed.

b) Study on a risk evaluation method for earthquake disasters
- The possibility of predicting the amplification characteristics of seismic motion from the bedrock to the ground surface using ground surface microtremors was investigated, and an evaluation method was

proposed to roughly estimate the disaster reduction effect of urgent earthquake alarms as well as the risk of structural damage and vehicle derailment.

c) Study on detection of abnormal human behavior for railways and an information distribution system
- An image processing algorithm was developed to detect abnormal acts such as physical violence by tracking multiple people in crowds, and a prototype system was built to deliver the detected results to nearby station staff and dispatchers or commanders.

d) Study on the evaluation of countermeasures to suppress displacement of existing Shinkansen viaducts during earthquakes
- It was confirmed that the application of damper-braces or irregularity preventive work increased the threshold ground surface seismic motion for derailment-free train operation by 200 to 300 gal.

e) Practical application of new train operation aptitude inspection item assemblage
- Analysis of the correlation between inspection records and the accident experiences of train operations staff were conducted. It was confirmed that workability and cognition inspection items (already included among the existing inspection items) and multi-option response and interruption suspension inspection items (newly adopted as inspection items) were valid as elements of the new train operation aptitude inspection assemblage.

(2) Railways with Increased Convenience

a) Development of a carbody vibration suppression system using controlled axle dampers
- Shinkansen running tests confirmed that a train vibration suppression system to control the damping of axle dampers and air springs improved the level of ride quality by 3 to 4 dB for operation at 300 to 320 km/h.

b) Study on riding comfort evaluation of tilting trains and a related improvement technology
- A simple tilt control system was developed to effectively improve the ride comfort of existing natural pendulum cars and passive tilting trains, and running tests confirmed the reduction of lateral vibration (which induces motion sickness) by approximately 30%.

(3) Low-Cost Railways

a) Development of a next-generation steel composite bridge with improved vibration suppression performance
- An actual-size prototype steel girder was constructed and fitted with a combination of ladder track and resiliently-supported floor slabs. Running tests on the RTRI test track conformed a noise reduction effect of 10 dB at a point near the girder compared to that of steel girders with conventional floor plates.

b) Development of an algorithm to create plans to adjust freight train operation
- An algorithm to automatically and quickly create a train crew rotation plan when train operation diagrams are disturbed was developed. It was confirmed that the algorithm was capable of creating a revised train crew rotation plan within a few seconds to cope with train operation disturbances of three to four hours.

c) Development of a contact-less vibration measuring technology for structures
- Using the U-Doppler system (which measures the vibration of structures without the need for contact), it was confirmed that the deflection of bridge girders and the natural frequency of river bridge piers could be measured from a point some 50 meters away, thereby demonstrating its suitability for diagnosing structural soundness.

(4) Environmentally Friendly Railways

a) Development of energy-regeneration-type battery-driven rolling stock
- A battery cooling structure was developed to suppress increased temperatures during charging, and a technology to quickly charge batteries using a large current was established.
- A hybrid LRV using power from trolley wires and

batteries was manufactured, and running tests were conducted on a commercial service line.

1.1.3 Basic Research for Railways

A total of 84 basic research projects were conducted.

(1) Conventional Railway System

[Dynamics]

a) Study on aerodynamic noise reduction techniques for pantographs used in high-speed operation

- A technique to reduce aerodynamic noise by applying a porous material to the pantograph surface was invented, and wind-tunnel/field tests confirmed a noise reduction effect of 1 to 3 dB in operation at 300 km/h.

[Simulation]

b) Study on railway vibration propagation into structures

- Scale-model shaking table tests were conducted on pile foundation structures commonly used in urban areas to clarify the damping effect for vibration propagating from the ground to structures, and a simple method to predict vibration was proposed.

c) Investigation on the phenomenon of radio noise emission from electric railways

- A simulation method was proposed to predict radio noise originating from running trains and emitted from power supply systems on the ground as an emission source. It was confirmed that the simulation model could estimate or reproduce the tendency of measured changes in electric field strength.

[Human Factors]

d) Method to evaluate the risk of errors in train operation work in consideration of background factors

- A risk evaluation method was proposed to diagnose human errors to be controlled on a priority basis and control techniques in train operation work, and a guidebook summarizing the purposes and procedures of risk evaluation and control was published.

[New Materials]

e) Study on concrete utilizing geopolymers

- The suitability of using geopolymers (a solidified mixture of coal ash – which is problematic in waste treatment – and silicate alkali solution) as concrete was confirmed.

(2) Magnetically Levitated Railway System

a) Study on performance evaluation and improvement of superconductive magnets

- The threshold current of yttrium-based wire to maintain a superconductive state was confirmed, and a prototype of a small superconductive coil was made.
- Data on the long-term durability of vehicles and ground facilities were collected in running tests on the Yamanashi Test Track.

1.2 Contract-Based Projects

The RTRI conducted 552 contract-based projects including surveys, developments and studies. Below are some examples of typical projects and clients.

MLIT*: Survey and study for maintenance of railway technical standards

Local Gov.: Survey on the effects of construction work adjacent to railway tracks

JRTT**: Research and development of a non-insulated ATC system for Shinkansen
Review on disaster prevention measures for Shinkansen slopes

JR†: Development of early earthquake detection and alarm systems
Wind tunnel tests of bridges

Private Co.: Review of long-term deterioration prevention measures for steel bridges
Survey and verification of rolling stock noise

* MLIT: Ministry of Land, Infrastructure, Transport and Tourism
** JRTT: Japan Railway Construction, Transport and Technology Agency
† JR: Japan Railway Company

1.3 Other Projects

(1) Surveys

The RTRI promoted the activities outlined below.

A staff member was dispatched to UIC to assist in their activities and a survey on European railway technologies.

A comparison of different transportation facilities with respect to energy efficiency was conducted based on systematic surveying, analysis and evaluation of technological information related to railways.

Basic information related to the RTRI's activities was surveyed, recorded and updated.

(2) Technical Standards Development

The RTRI drafted revised editions of Foundation and Retaining Structure Design Standards, Seismic Design Standards and Track Structure Design Standards, and promoted surveys and studies on the design of mountain tunnel lining as well as the design and maintenance of railway structures.

With respect to international standards, the RTRI performs the role of National Secretariat for IEC* TC9 (Electrical equipment and systems for railways). Our proposal to draft an international standard for the railway application of linear induction motors (LIM) was approved by the TC9 committee, and an international project team was organized. The RTRI hosted a railway expert group meeting for a JISC-CENELEC** conference held in Japan.

(3) Information Services

The RTRI distributes railway technical information through its website and literature retrieval service. All the contents of *RTRI Report*, *RRR* and *QR* were recently uploaded on the website. We also gather books and documents related to railways and scientific technologies, and computerizes such documents kept in its library in order to create an electronic resource.

*IEC: International Electrical Commission
**JISC: Japanese Industrial Standards Committee
CENELEC: European Committee for Electrotechnical Standardization

(4) Publications and Workshops

The RTRI's periodicals, RTRI Report, RRR and QR, were colorized. The RTRI Lecture was held under the main theme of *Change Railway Maintenance - New Ideas and Application of Technologies*. Regular-basis workshops such as the Monthly Presentation were held 11 times, and 26 Railway Technology Seminars were conducted.

(5) Diagnosis and Advisory Services

The RTRI offered consultancy services 364 times, mainly for railway operators. These included investigation on the causes of rail failure and malfunction of shunt performance, evaluation on rolling stock performance, technical advisory on inductive interference measurements, and dispatch of lecturers.

1.4 Railway Technology Promotion Center (RTPC) Activities

The RTPC organized the above-mentioned technical standard development projects, which involved drafting three revised-edition design standards for railway structures, two related survey projects and the development of eight pieces of design-aiding software. In the area of test and research projects, the RTPC organized six projects; four of these were completed, including surveys and studies on extending the inspection period for the tracks and EMUs of non-conventional railways.

The RTPC plays a cooperative role with various railway-related companies in Japan by providing valuable information in a range of technical fields to solve problems concerning railway technologies. Its major activities consist of providing technical consultation for railway operators, on-site technical surveys and advice by registered engineering experts, technical information-sharing and organizing workshops. It conducted seven on-site technical consultations, organized workshops, dispatched lecturers to technical committee meetings held by several railway-related associations and regional technical exchange meetings,

and responded to approximately 80 technical inquiries from member companies including on-site surveys as required. It also started production of a textbook on track engineering for mid-career engineers.

The RTPC also administers the Railway Design Engineer Examination – a qualification in technical expertise on managing railway design that aims to enhance the technical capabilities of railway engineers in Japan. In FY 2007, 149 engineers out of 803 applicants passed the examination.

1.5 Other Activities

(1) International Activities

The RTRI promotes joint research projects with overseas universities and railway-related research organizations. In September, it held a joint research seminar with the SNCF in Tokyo. The RTRI simultaneously organized and held the Franco-Japan Railway Technology Symposium jointly with the French Embassy in Japan, the Japan-France Society for Industrial Technologies and the SNCF.

The RTRI participated in the annual China-Korea-Japan Railway Research Technical Meeting in Uiwang held by the KRRI in September 2007, and supported preparatory work for the WCRR 2008 to be held in Seoul in May 2008.

(2) Development of a Gauge Change Train

As a member of the Free-Gauge Train Technology Research Association (FGT Association), the RTRI participated in the planning of running tests, which started in June 1997, field test measurements and bogie remodeling projects.

2. Others

(1) Environmental Preservation

In order to contribute to the preservation of the global environment, the RTRI made efforts to cut power consumption according to its implementation plan for FY 2007.

(2) Improvement of Equipment and Facilities

The RTRI is constructing new large-scale shaking table test equipment to simulate severe earthquake motion, and is remodeling its rolling stock test plant.

(3) Industrial Property Rights

The RTRI applied for 235 patents and obtained 160 new registered patents in FY 2007. The total number of patents in its possession was 2,221 at the end of the fiscal year.

(4) Visitors

The Kunitachi Institute received approximately 1,600 visitors and the Maibara Wind Tunnel Technical Center about 300 visitors.

Activity Plan for FY 2008

1. Fundamental Policy

In the wake of the 20th anniversary of its foundation, the RTRI will reinforce its accumulated technological capabilities, re-confirm its presence as an integrated railway technical institute and aim toward further development into the future. In FY 2008, or the fourth year of the implementation of its master plan *RESEARCH 2005*, we will promote various business activities, while carefully and properly assessing the state of progress and prioritizing important subjects, to attain a solid level of achievement. The RTRI will also promote timely R&D that contributes to the management of railway operators (including JR companies in particular), promptly share the outcome with customers and make efforts to raise the efficiency of its management.

In its R&D activities, the RTRI will maintain close relationships with the government and railway operators, and will integrate its power in promoting R&D related to human errors, earthquakes, strong winds and other natural disasters with the aim of establishing safe and reliable railways. We will also pay attention to the preservation of global and wayside environments, and will apply IT and other advanced technologies to realize further low-cost, highly convenient railways. We will promote R&D efficiently by strengthening cooperation with domestic and overseas universities and research institutes. In the research division for the magnetically levitated railway system, the RTRI will continue R&D activities to apply the know-how and technologies of superconductivity and linear motors to conventional railway systems.

2. Activities Related to Test and Research

2.1 Test and Research Projects

Based on the master plan *RESEARCH 2005*, the RTRI will steadily promote R&D in FY 2008 to further improve the safety and reliability of railways, pay attention to the preservation of global and wayside environments and apply IT technology to the realization of low-cost, highly convenient railways.

To promote R&D efficiently, the RTRI will positively utilize contract research and joint research projects with universities and other research organizations, conduct R&D reviews with research advisors who are assigned to give advice on our research projects and evaluate the outcome of research activities from the viewpoint of external experienced scholars.

2.1.1 R&D for the Future of Railways

The RTRI will promote 13 assignments including the following projects that are expected to result in technological breakthroughs toward the future of railways.

a) Development of a method of evaluating vehicle dynamic characteristics using a hybrid simulator
- Fundamental design will be conducted for a test bogie whose running behavior can be controlled using a real-time simulator that assimilates vehicle running by coupling computers and test equipment.

b) Seismic evaluation and countermeasures for existing railway facilities
- Seismic strengthening methods will be developed in consideration of the interaction between civil engineering structures, buildings and overhead contact line facilities.

c) Study on performance improvement and maintenance work streamlining for the current collection system
- A prediction method will be developed to estimate wear on contact wire using the contact force and the volume of contact loss arcs measured on the wire.

d) Development of a broadband communication technology for railways
- An on-board switchover technology will be developed to maintain the contact with ground stations required for optical communication between trains and ground facilities.

e) Application of linear motor technologies to conventional railway systems
- Technologies to improve the supporting force of superconductive bearings used for flywheel storage batteries in railways will be developed.

2.1.2 Development of Practical Technologies

The RTRI will promote technical development projects to solve specific local or on-site problems designated individually by JR companies, and will promote projects in the field (especially where we have a competitive edge or advantages in development), such as derailment prevention measures for Shinkansen turnouts, wind observation methods for train operation control in strong winds, a low-cost train control system using

general-purpose radio transmission technology, and a technique to improve safety consciousness among operators. Through close cooperation and communication with railway operators, the RTRI will make a concerted effort not only to understand their precise needs but also to offer timely achievement.

2.1.3 Basic Research on Railways

The RTRI will promote basic research projects (including the elucidation of railway inherent phenomena, simulation, and the application of new technologies, materials and research techniques) necessary to solve various railway-related problems.

For conventional railway systems, research projects such as studies on the behavior of rolling stock exposed to cross winds, wheel damage in consideration of rail contact, and elucidation of the phenomenon of wayside low-frequency noise and the development of reduction techniques will be conducted.

For the magnetically levitated railway system, participation in running tests on the Yamanashi Test Line and the development of performance evaluation and inspection methods for ground coils and superconductive magnets will be conducted as R&D activities to maintain the technical ability required for the method's application to conventional railway systems.

2.2 Contract-Based Projects

The RTRI will promote contract-based research projects in the fields of engineering and system integration where its integrated power can be exerted. We will also positively continue marketing activities and organize technology exchange workshops to introduce its research products, increase contracts and sell RTRI-branded items.

2.3 Other Projects

(1) Surveys

The RTRI will systematically continue to collect, analyze, evaluate and store technological information on railways and related fields in Japan and other countries. We will also implement surveys on the technological movements of other transport facilities to utilize this information toward new technologies and research for railways in the future.

(2) Technical Standards Development

The RTRI will further promote the revision of Foundation and Retaining Structure Design Standards, Seismic Design Standards and Track Structure Design Standards, and will promote surveys and studies on design guidelines for mountain tunnel lining.

The RTRI will also act as the national secretariat for IEC TC9 and host a railway expert group meeting at the Japan-Europe Standardization Congress.

(3) Information Services

The RTRI will promote various projects in the same way as in past years.

(4) Publications and Workshops

The RTRI will promote various projects in the same way as in past years.

(5) Diagnosis and Advisory Services

The RTRI will promote various projects in the same way as in past years.

2.4 Railway Technology Promotion Center (RTPC) Activities

The RTPC will promote various projects to appropriately reflect the needs of those involved in its activities, and will widely publicize the details of its work.

The Center will also implement survey and research projects to ensure the safety of railways as well as projects requested by members. It will administer the Railway Design Engineer Examinations in Tokyo and Osaka, and will provide information, enrich the safety database, positively develop railway advisor activities to extend technical support, and edit textbooks contributing to the succession of technologies among railway operators. To strengthen communications with members and the transmission of information, the RTPC will organize workshops and opinion exchange meetings in various regions.

2.5 Other Activities

(1) International Activities

As a means of maintaining cooperation with overseas railway-related research organizations, the RTRI will continue joint research projects with the SNCF, the CARS and the KRRI, will participate in the WCRR 2008 to be held in Seoul in May 2008, and support preparatory work for the 9th WCRR.

(2) Development of a Gauge Change Train

As a member of the FGT Association, the RTRI will plan running tests for a new train set, implement measurements in the tests, and remodel the bogies used.

(3) Improvement of Equipment and Facilities

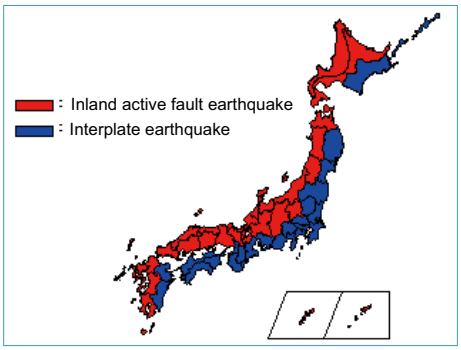
The RTRI will complete the construction of large-scale shaking table test equipment to simulate severe earthquake motion, and will continue to remodel its existing rolling stock test plant.

Major Results of Research and Development in FY 2007

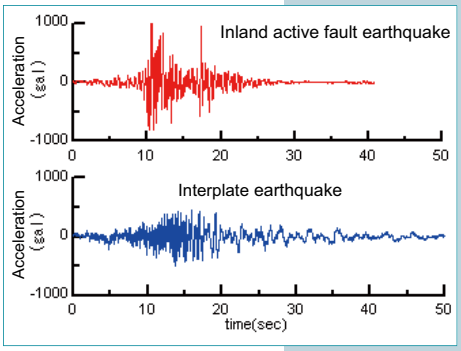
I. Safety/Reliability

1. The setting of standard seismic waves to enable evaluation of the earthquake-resisting performance of existing railway facilities

- Categorization of Japan's prefectures into two groups by the type of dominant earthquake, one characterized by inland active fault-type earthquakes and the other by interplate earthquakes (each allotted a standard seismic wave), to allow evaluation of the earthquake-resisting performance of railway facilities.



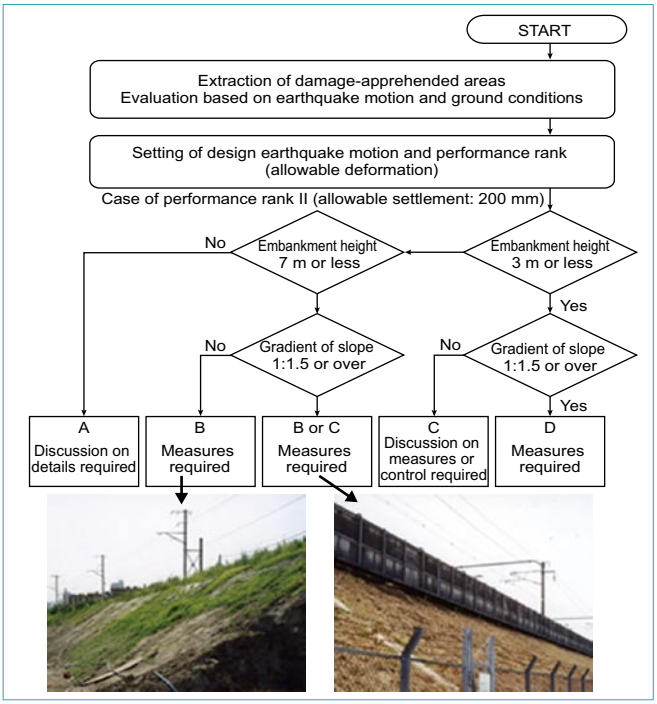
Classification of prefectures by earthquake type



Standard seismic waveforms formulated

2. A technique to evaluate the earthquake-resisting performance of simple earth structures

- Proposal of a simple technique to evaluate the earthquake-resisting performance and damage prevention work for earth structures according to their construction and dimensions.
- Creation of a map for use in selecting damage-apprehended areas based on disasters in the past and assumed earthquake motion.



An example of the technique's application to evaluate the earthquake-resisting performance of embankments
(Judgment index: Low A ← (earthquake-resisting performance) → D high)

3. A technique to extract scouring-apprehended bridge piers

- Preparation of two scoring books for use in extracting scouring-apprehended bridge piers.
- The scoring table applicable to general inspection assumes visual inspection without requiring high-level expertise.
- The scoring table used for individual inspection evaluates the stability of bridge pier foundations into the future.

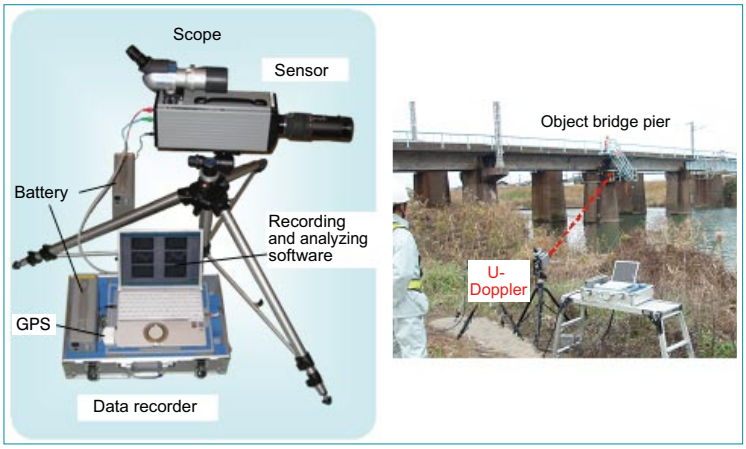
Scoring table for primary extraction (excerpt)

	Evaluation item		Distinction	Score
Environmental conditions of river	Topography		Plain	10
			Valley plain	10
			Alluvial fan	0
			Mountainous area	5
	Narrowing of river width		No	15
			Yes	0
	Substance of riverbed		Sand	10
			Gravel	0
			Exposed rock/boulder	10
	Lowering of overall river beds		Yes	0
			No	10
Environmental conditions of bridge (bridge pier)	Position of bridge pier relative to curve of river		Straight line and inside of curve	15
			Outside of curve	0
	Position of bridge pier relative to dry riverbed		In running water	5
			Land (without revetment)	10
			Land (without revetment, adjacent to watercourse)	0
			Land (with revetment)	25
			Land (with revetment, adjacent to watercourse)	15
	Groundsill		None	20
		Height	~1m	5
			1m~2m	0
			2m~	♦
		Deformation	With deformation	♦
		Scope of execution	Part of river width	♦
	Ratio of underground depth to width of pier	Spread foundation / Pile foundation	Inclined scoring with depth ratio 1.5 as full points and 0 as 0 points	50
		Well foundation	Inclined scoring with depth ratio 3.5 as full points and 1.0 as 0 points	
	Change in penetration depth		Increase/decrease of 1.5 m or over	♦
	Incomplete bonding at foundation bottom		Seemingly incomplete bonding at bottom	15
			Incomplete bonding at bottom	30

* The points scores for the relevant items are added; those with lower total scores are deemed susceptible to scouring.
* A ♦ mark indicates that scouring is apprehended for the bridge pier irrespective of the total score.

4. The U-Doppler non-contact vibration measuring system for structural diagnosis

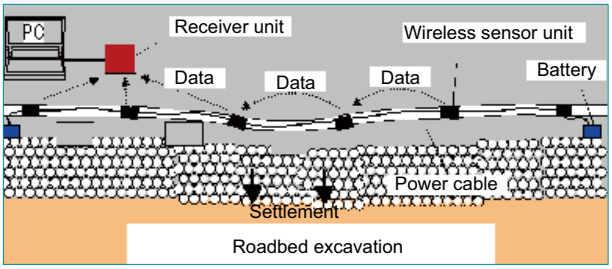
- Development of a practical non-contact-type vibration measuring system for structures.
- Estimation of the natural frequency of viaducts and bridge piers, and measurement of dynamic bridge girder deflection at train passage for soundness diagnosis.



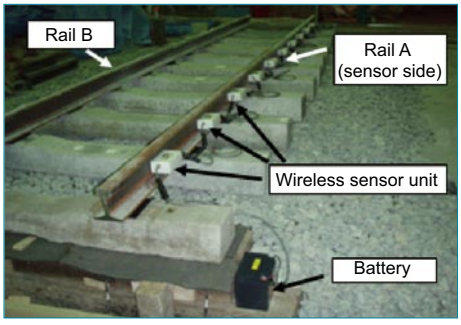
U-Doppler

5. A track and roadbed displacement monitoring system using a wireless sensor network

- Development of a system that can be made use of for purposes such as monitoring track and roadbed displacement caused by nearby construction work or other disturbances using a wireless sensor network and that can be set up at a cost equal to or less than half that of the conventional system.



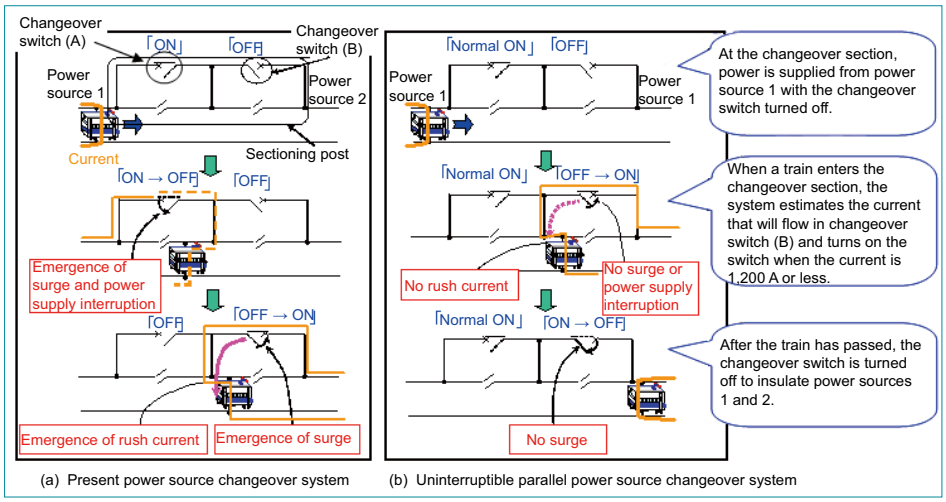
A conceptual drawing of the track/roadbed displacement monitoring system



Wireless sensor unit

6. An uninterruptible parallel power source switchover system for Shinkansen changeover sections

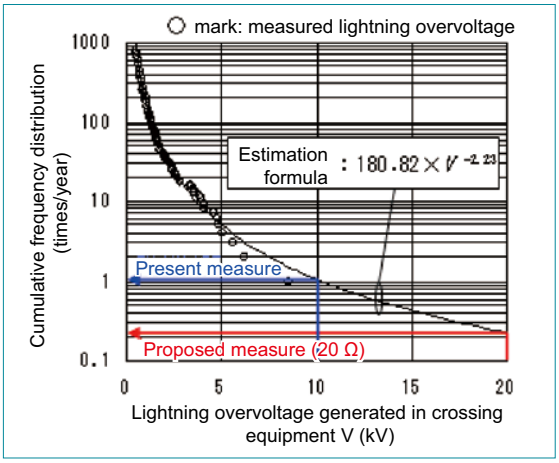
- Development of a system to supply power without interruption to EMUs passing a swi-tchover section.
- The parallel power source changeover system developed is applicable to sectioning posts (SPs).



An outline of the uninterruptible parallel power source changeover system

7. Lightning-strike prevention measures for signal equipment and a technique to evaluate their effect in reducing lightning-related damage

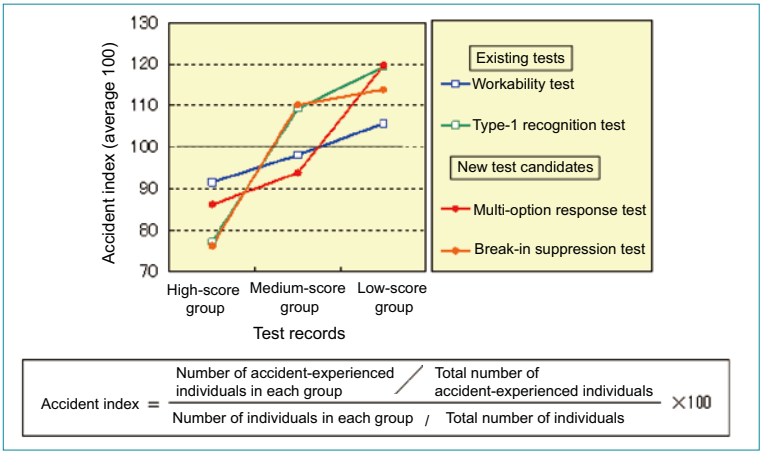
- Proposal of lightning-strike prevention measures to double the lightning-strike resistance of electronic train detectors.
- Reduction of lightning-strike damage to about one-fifth through lightning-strike prevention measures.



Distribution of the frequency of lightning overvoltage on crossing equipment

8. A technique for a new train operation aptitude test

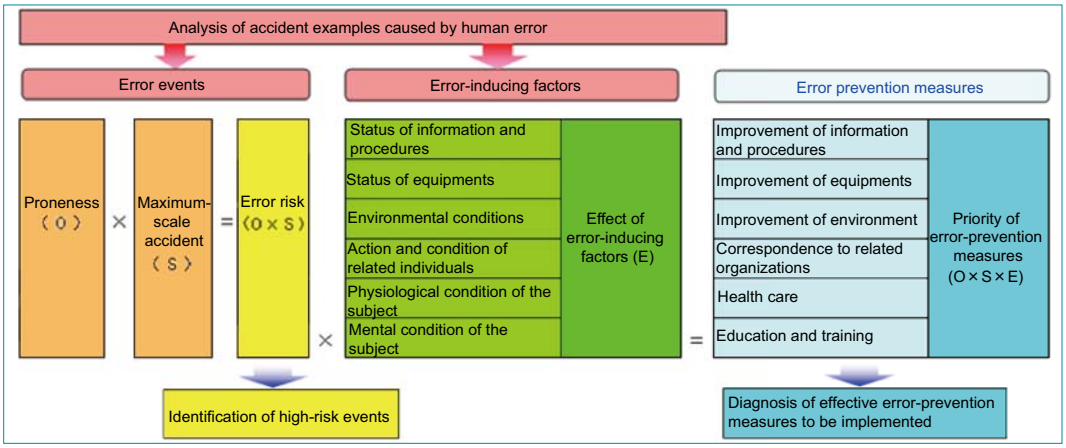
- Proposal of a new train operation aptitude test by reshuffling of its test items, including the adoption of multi-option response testing with a view to evaluating coping capabilities in abnormal situations.



Relationship between test records and accident indexes

9. A technique to evaluate risk in train operation in consideration of error-inducing factors.

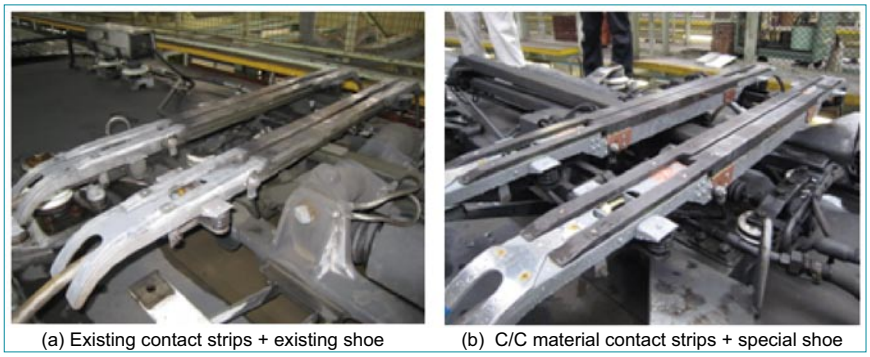
- Development of a technique to evaluate human-error risk in train operation.
- Useful identification of human error to be handled on a priority basis and of preventive measures against such errors.



An outline of the risk evaluation technique

II. Economy/Efficiency

1. Lightweight carbon-based contact strips for existing railways



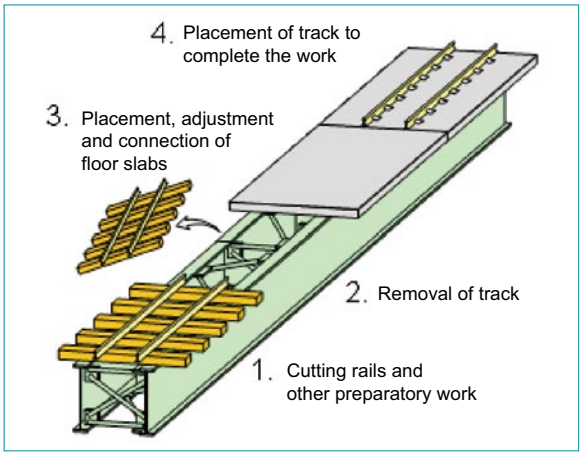
(a) Existing contact strips + existing shoe (b) C/C material contact strips + special shoe

Appearance of the existing shoe for existing contact strips and the special shoe for contact strips made of C/C material

- Development of lightweight mixed/sintered carbon-based contact strips to reduce the wear rate by 25%.
- A wear rate reduction of about 50% obtained with screw-fixing-type contact strips made of carbon fiber-reinforced carbon (C/C) composite material used on a special shoe.

2. A technology to improve a structural system of existing steel bridges

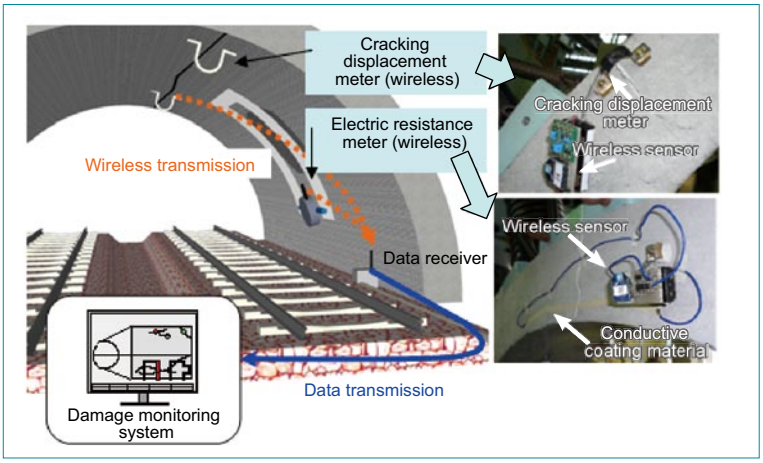
- Invention of a method to compose concrete decks to existing steel briges.
- Development of a technique to install the concrete deck simply at a site without delay of train services.



Flow of work to introduce a composite structure

3. A tunnel damage monitoring system using IT

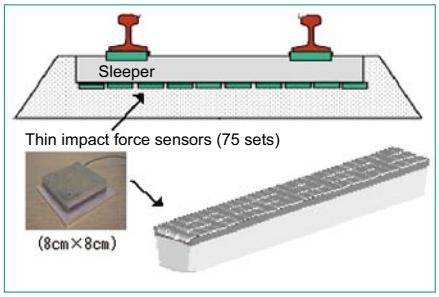
- Development of a system to detect the occurrence and position of cracking in tunnel lining painted with a conductive coating material and to monitor the progression of cracking using compact, energy-saving wireless sensors.



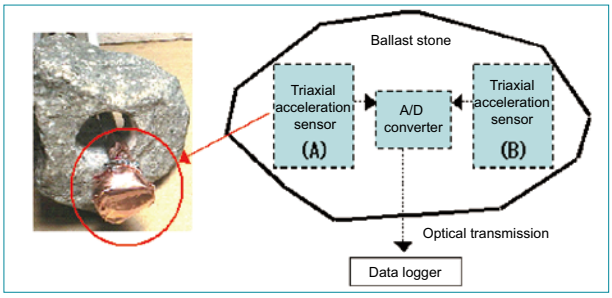
Method to monitor cracking with wireless sensors

4. Methods to measure and analyze the dynamic behavior of ballasted tracks in the field

- Development of a sensing sleeper to measure the distribution of dynamic pressure on a sleeper bottom.
- Development of a sensing stone to measure the three-dimensional behavior of ballast stones.
- Development of modeling techniques to analyze the dynamic behavior of ballasted tracks using a three-dimensional distinct element model.



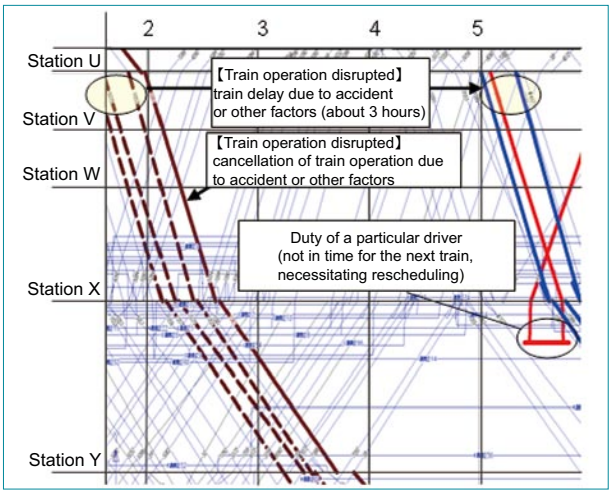
A conceptual drawing of a sensing sleeper



A conceptual drawing of a sensing stone

5. A freight train driver rescheduling system

- Development of a train driver rescheduling system when freight train operation is disrupted.
- Creation of rescheduling plans in about 20 seconds, even for areas with high-frequency freight train operation.

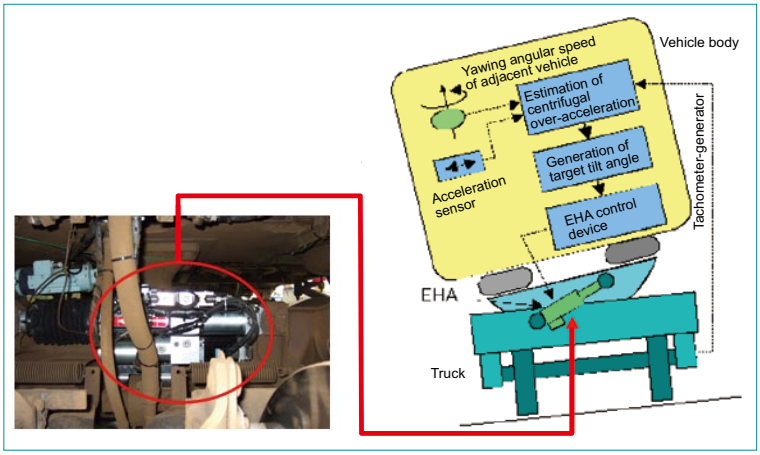


A screen of the system (example) (with the train operation disrupted)

III. Comfort/Convenience

1. A low-cost tilting control system

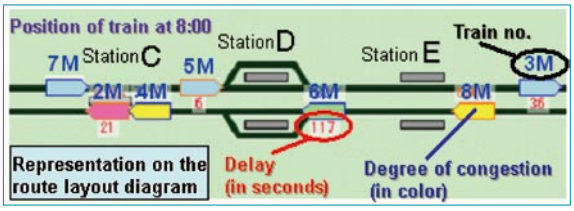
- Development of a tilting control system at a cost of one third that of the existing setup.
- Reduction of the index of motion sickness on titling vehicles by 30% or over.



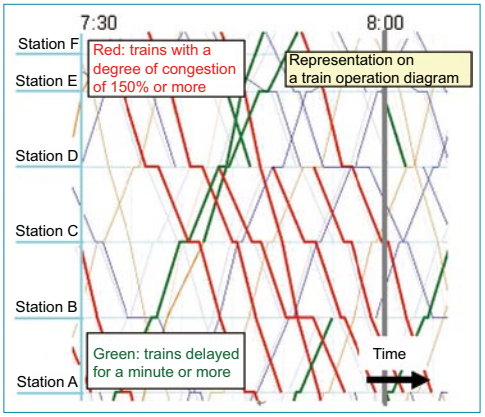
Composition of the low-cost tilting control system

2. A system to predict train delay and passenger behavior after the revision of train operation diagrams

- Development of a system to predict train delay and passenger behavior after the revision of train operation diagrams.
- Advanced verification of the revision plan of train operation diagrams using evaluation indices from passengers' viewpoints.



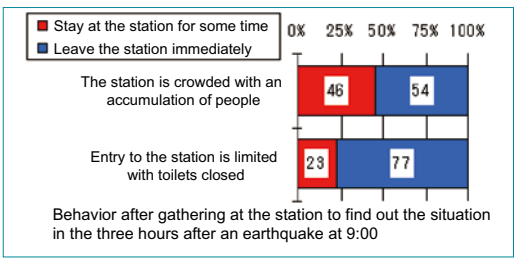
Estimation of the degree of congestion and train delays during the morning rush hour



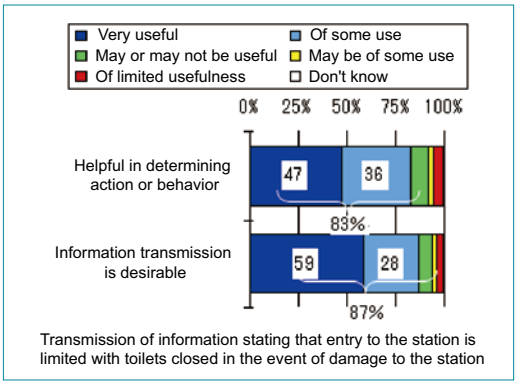
Estimation of the degree of congestion and train delays under a revised train operation diagram

3. Behavior of stranded people after large-scale earthquakes

- Verification of a wave of persons unable to return home to stations and of the desirability of transmitting routine information at stations, from studies on the behavior of users after large-scale earthquakes in large cities based on a survey of earthquake after-effects.



Behavior of people gathering at stations in the three hours after an earthquake



Evaluation of routine information transmission

IV. Harmonization with the Environment

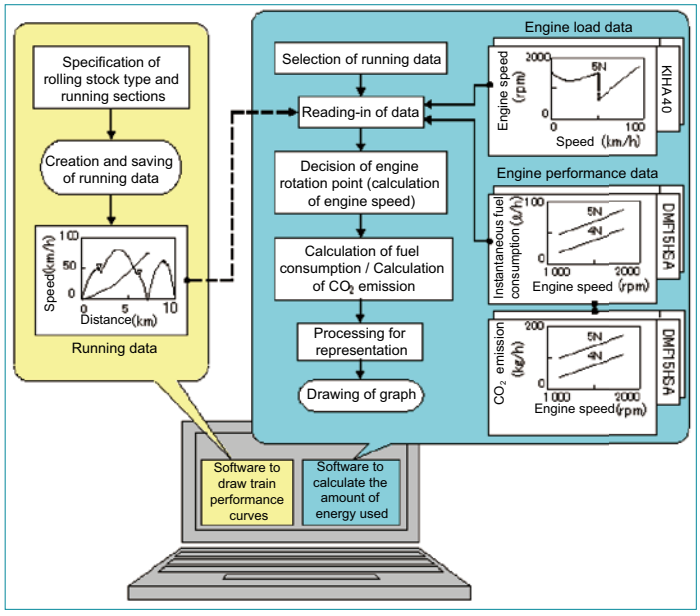
1. Development of contact-wire/battery hybrid trains through the application of a quick battery charging technology

- Development of contact-wire/battery hybrid trains that can continuously run between non-electrified sections through the application of a quick battery charging technology enabling continuous charging at 1,000 A for 60 seconds.

Quick charging from rigid contact wires (with a combination of sintered copper contact wires and carbon contact strips)

2. A system to calculate the amount of energy consumed by diesel vehicles

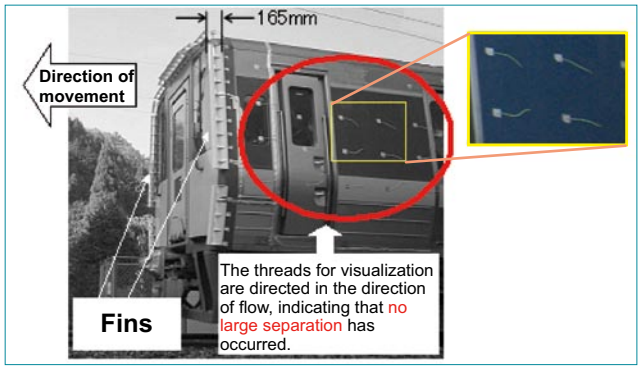
- Development of a calculation system to estimate the fuel consumption in the running section in order to improve energy saving of diesel vehicles.



Composition of calculation system

3. Improvement of the aerodynamic characteristics of bluff-nose trains on meter-gauge railway lines

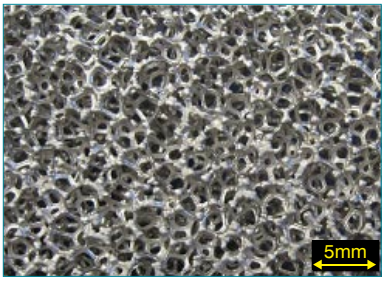
- Proposal of rounded and finned configurations of the front ends of vehicles to improve the aerodynamic characteristics of bluff-nose trains on meter-gauge railway lines.



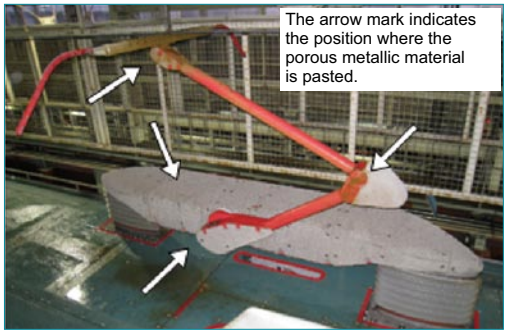
Fins to suppress airflow separation (a test on a commercial service line)

4. A technique to reduce pantograph aerodynamic noise by pasting porous material on the surface

- Development of a technique to reduce pantograph aerodynamic noise by pasting porous material on the surface.
- Wind-tunnel test verification of the technique's effect in reducing the aerodynamic noise of pantographs by 1 to 3 dB.



Porous metal



A Shinkansen pantograph (Type 2) treated with porous metal

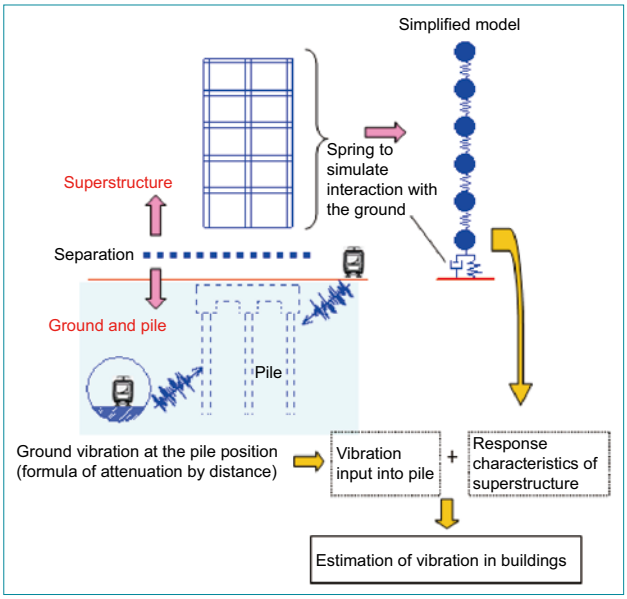
5. Low-noise steel bridges

A new type of steel bridge with a floating structure

- Development of two types of low-noise composite bridge.
- Possible to reduce vibration velocity level by 10 dB with floating structure bridges and by 7.8 dB with bridges sprayed with polymer-cement mortar.

6. A simple technique to estimate the propagation of vibration from railway facilities to buildings

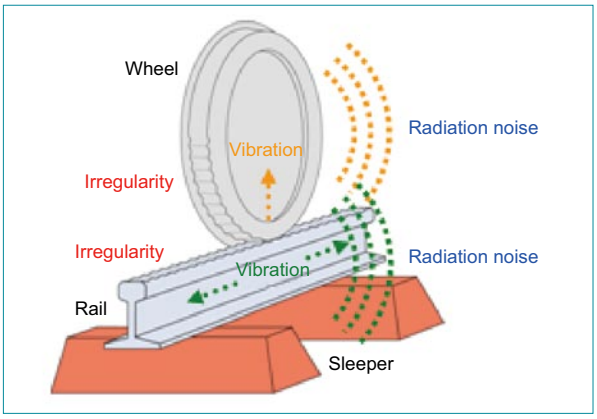
- Clarification of the mechanism of vibration propagation from the ground to buildings.
- Development of a simple technique to estimate vibration in consideration of the interaction between the ground and buildings.



An outline of the technique to estimate vibration

7. A technique to estimate rolling noise using a vibration/acoustics model of the track/wheel system

- Development of vibro-acoustic models to understand rolling noise generated by wheel/rail interantion.
- Estimation of contributions of wheel and rail components of noise to rolling noise.



Rolling noise-generating mechanism

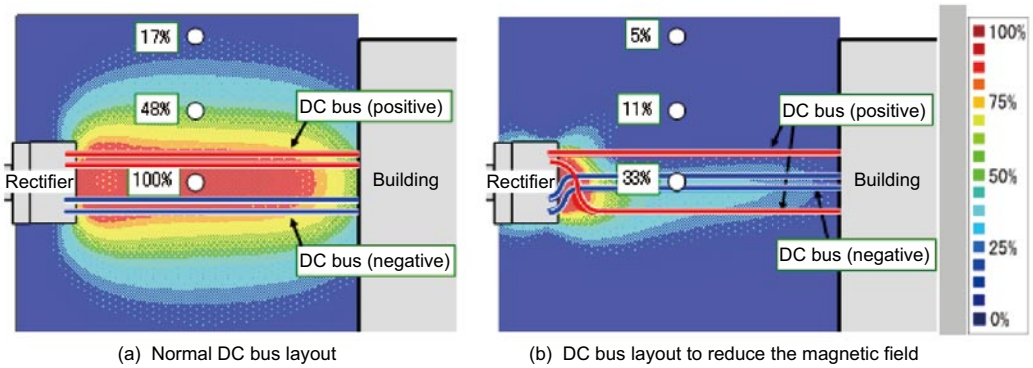
8. New concrete with a low environmental load through the use of geo-polymer method

- Proposal of a technique to manufacture geopolymer concrete with a low environmental load using coal ash.
- Can presumably reduce CO_2 emissions by about 90% compared to normal cement.

Acid proof test (immersion in 10% sulfuric acid solution)

9. Measures to reduce the electromagnetic field around substations

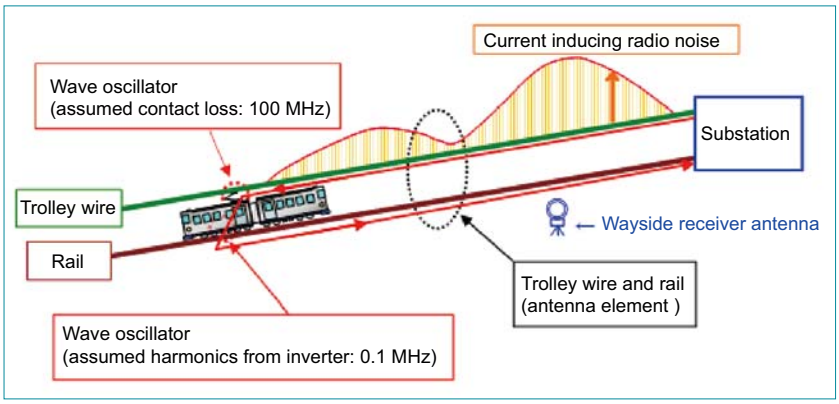
- Development of a technique to accurately calculate the electromagnetic field around AC and DC substations.
- Establishment of measures to effectively reduce the electromagnetic field generated.



(a) Normal DC bus layout (b) DC bus layout to reduce the magnetic field

A measure to reduce the electromagnetic field generated by DC railway substations (relative values with the generated maximum DC magnetic field are taken as 100%)

10. A technique to estimate wayside radio noise radiated from running trains



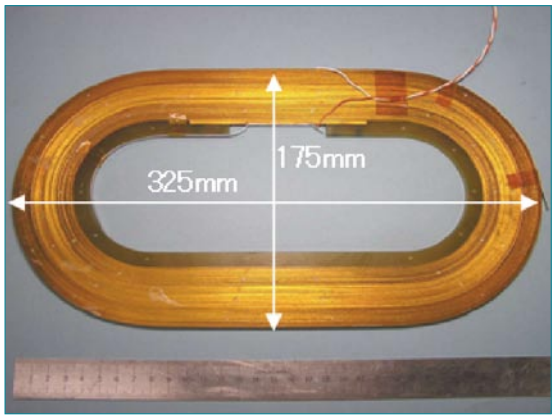
Concept of basic analysis model

- Confirmation of the reproducibility of radiant intensity fluctuation characteristics with a basic model designed to estimate radio noise, with running vehicles regarded as an excitation source and contact wires and rails as a radiation antenna

V. Maglev System

1. Characteristics of a small racetrack-type superconducting coil made of high-temperature superconducting wires

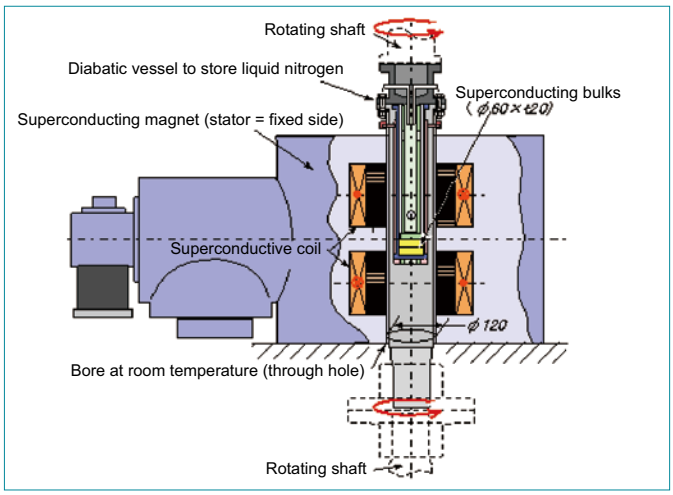
- Manufacture of a small prototype superconducting coil using yttrium-based high-temperature superconducting wires.
- Estimation of weight reduction by about 40% with superconducting coils and refrigerators and lower power consumption of about 40% with refrigerators.



A small prototype racetrack-type superconducting coil

2. A superconducting magnetic bearing that combines magnets and superconducting bulk bodies

- Manufacture of a prototype superconducting magnetic bearing combining superconducting magnets and superconducting bulks.
- Verification of the bearing's performance in supporting a static load of 10 kN or over and a 500-kg body rotating afloat at high speed in a stable manner.



A schematic drawing of the prototype superconducting magnetic bearing

International Activities

The major international activities of the RTRI are the promotion of international exchanges and development of co-operative relationships with overseas railway research organizations, and promotion of international standardization in the railway field.

Signing Ceremony at the 7th China-Korea-Japan Railway Research Technical Meeting

1. Joint Research with Overseas Organizations

(1) Asia

Trilateral joint research activity has been extensively conducted among the CARS*, the KRRI** and the RTRI. It originated from two separate bilateral joint research activities between the CARS and the RTRI which started in 1992, and the KRRI and the RTRI which started in 1999. In 2000, the three parties agreed to hold a technical meeting to report joint research projects.

The first China-Korea-Japan railway research technical meeting was held at KRRI in 2001. Since then, the railway research technical meetings have been held annually, rotating between each institute so that presentations could be made about the fruits of the research and the latest information exchanged.

The 7th railway research technical meeting was held at the KRRI in Uiwang (a suburban city near Seoul) in September 2007.

The total number of current joint research projects is 8 and the RTRI is involved in the following 3 projects.

- Monitoring system for railway infrastructure
- Life cycle assessment for railway system
- Management of polluted railway track

(2) Europe and US

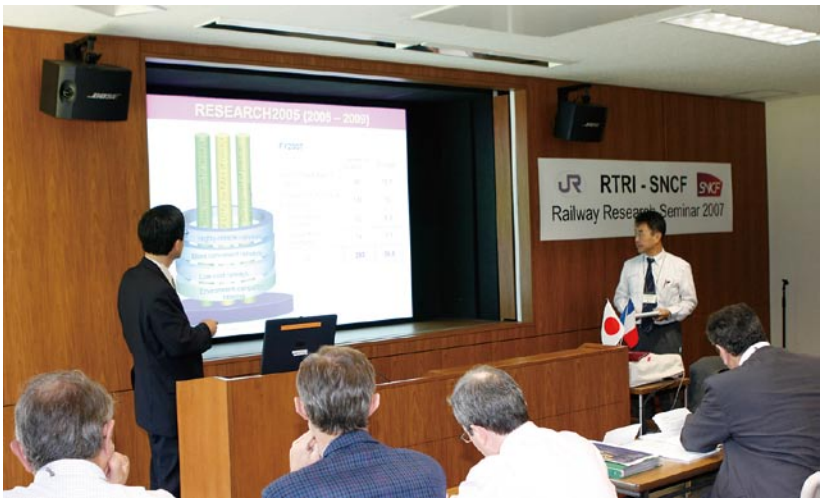
The RTRI and SNCF† agreed to conduct joint research projects in November 1995 and have since been performing extensive technical exchanges and mutual visits.

In May 2007, a research seminar meeting was held in Tokyo and determined to start the 4th phase joint research projects pertaining to the fields of rolling stock, tracks, current collection, track circuits, riding comfort, fuel cells and derailments.

The SBB†† and the RTRI signed a research collaboration agreement in March 2007 and has been co-operating in the field of transport information technology.

The RTRI is also co-operating currently with the following universities and research organizations: Cambridge University in England (structures), Newcastle University in England (track), Technical University at Braunschweig in German (signalling), Cagliari University in Italy (track), Geo Delft in the Netherlands (durability of urban tunnels) and Massachusetts Institute of Technology in the USA (materials).

* CARS: China Academy of Railway Sciences
** KRRI: Korea Railroad Research Institute
† SNCF: Société Nationale des Chemins de Fer Français / French National Railways
†† SBB: Swiss Federal Railways



RTRI - SNCF Research Seminar Meeting

2. International Standardization

(1) Activities for IEC TC9

The RTRI has been handling the work of the secretariat of the Japanese national committee for the IEC TC9. We sent technical members to the TC9 Plenary meeting and its various working group meetings, and held a large number of domestic committee meetings. The convener of new WG in charge of the standardization for environmental conditions of railway rolling stock and facilities was elected from Japan. A new proposal to develop a standard for the linear induction motor for transport traction was made by Japan and our preparation for the working draft was started.

(2) Collaboration related to International Standardization

A JISC-CENELEC information exchange meeting was held in Tokyo to foster general collaboration related to standardization between Japan and Europe. Extensive information exchanges were also conducted among railway engineers. The participants visited the RTRI after the meeting.

(3) Publicity Activities

The RTRI has been performing publicity activities for international standardization in railway field in Japan. We held a seminar on International Standards in Tokyo with about one hundred participants.

We inaugurated a commendation system to reward publicly people who contributed to the international standardization activities in railway fields.

Technical Visit of JISC-CENELEC Information Exchange Meeting

Franco-Japan Railway Technology Symposium

3. Other Activities

(1) WCRR

The World Congress on Railway Research (WCRR) has its roots in an international seminar held in Tokyo in 1992 organized by the RTRI that invited executives in charge of R&D from the world's major railway operators. The seminar was developed and expanded as an essential international conference for railway research engineers in the world to exchange information and stimulate discussions on updated and innovative railway technologies.

The RTRI has co-operated closely with the organization committee to prepare WCRR2008 (held in Seoul, Korea) by dispatching executives, submitting papers in the various fields, and inviting sponsors and exhibitors. The RTRI also exhibited a booth coordinating JR group companies.

(2) Franco-Japan Railway Technology Symposium

To commemorate the elapse of more than ten years of joint research activities between the RTRI and the SNCF, a symposium on the history and current status of Japanese and French Railway Technology Exchanges was organized. The symposium was held at an auditorium in the Maison Franco-Japonaise in Tokyo in May 2007 under sponsorships of the French Embassy in Japan, la Société Franco-Japanaise des Techniques Industrielles, the SNCF, and the RTRI.

(3) Co-operation with UIC

We have co-operated with UIC* by sending a member of staff to work in the headquarters and to exchange technical information with European railways. The RTRI started preparation for the visiting of the UIC Panel of Structural Experts to Tokyo and holding an UIC technical exchange seminar in September 2008.

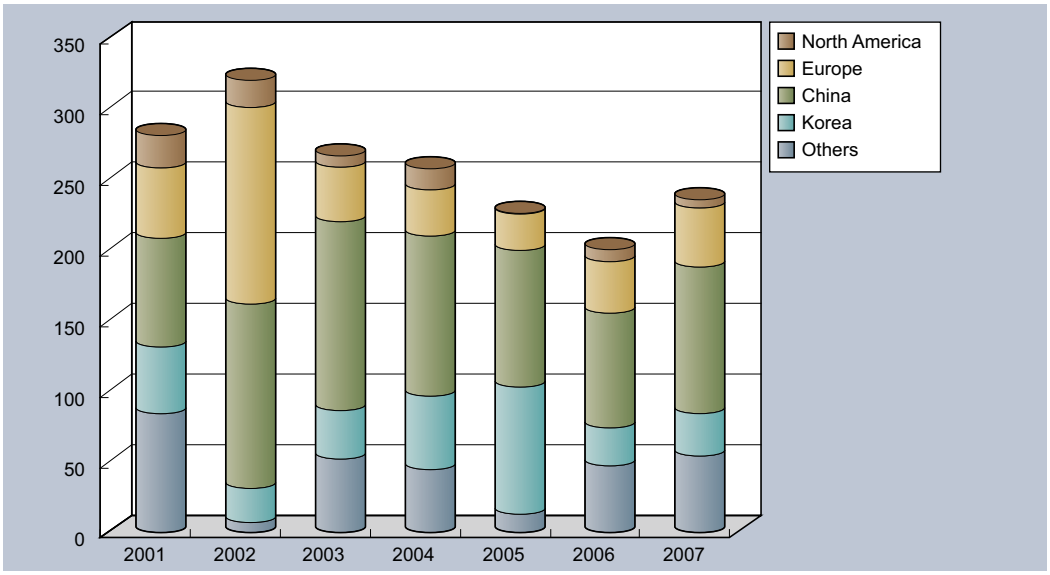
*UIC: Union Internationale des Chemins de Fer / International Union of Railways

Speech in UIC HighSpeed2008

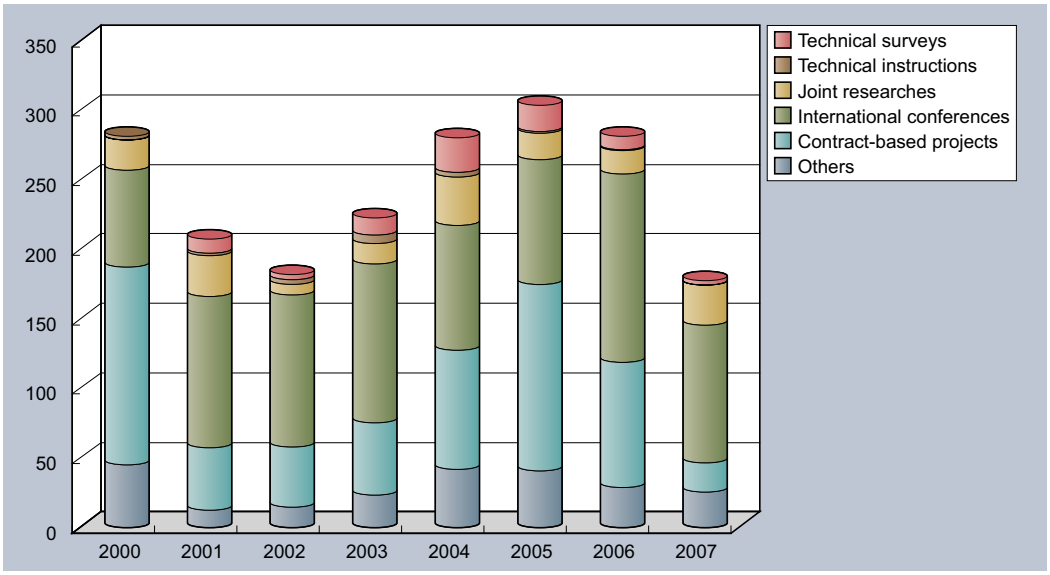
4. Visitors and Business Trips

The statistics on visitors to the RTRI from overseas and on the RTRI staff members who made overseas business trips are shown in the following figures.

(1) Visitors from Overseas



(2) Overseas Business Trips



Appendix

A Brief History of the RTRI

Date		Events
1907		Founded as an in-house research institute of the Japanese government.
1949		Became an in-house research institute of the Japanese National Railways (JNR).
1986	Dec. 10	Establishment of the RTRI as an independent organization authorized by the Minister of Transport.
1987	Apr. 01	The RTRI inherited the R&D arm of JNR upon its division and privatization.
	Jun. 17	Running tests of the MLU002-type car started at the Miyazaki Maglev Test Track.
1988	Sept. 27	RTRI Seminar on deep-underground railways held.
	Nov. 09	First RTRI Lecture on "Improving the Railway System."
1990	Jun. 25	Basic plans of the technological development of the superconducting magnetically-levitated transport system and the construction of the Yamanashi Maglev Test Line approved by the Minister of Transport.
	Nov. 15	New rolling stock test plant completed.
1991	Mar. 22	RTRI's Mid- and long-term master plan formulated.
	Mar. 31	Test Plant E (human science) completed.
	Oct. 16	First railway technology exhibition (forerunner of the current RTRI Forum).
1992	Sept. 29	First lecture series on education (forerunner of the current Railway Technology Courses).
	Oct. 13	International railway research seminar on "R&D in World Railway -Today and Tomorrow-" (later developed into WCRR).
	Dec. 15	Japan-China joint research started.
1993	Jan. 31	Brake Test Stands completed.
1994	Nov. 04	RTRI website went on-line as the world's first official site on railway technologies.
	Nov. 13	Agreement on cooperative research concluded with the International Union of Railways (UIC).
1995	Jan. 17	Hyogo-ken Nambu earthquake (participation in recovery support activities).
	Jan. 26	MLU002N-type car attained 411 km/h in manned running at the Miyazaki Maglev Test Track.
	Mar. 29	Mid- and long-term master plan revised.
	Nov. 13	Agreement on cooperative research concluded with French National Railways (SNCF).
1996	Jun. 05	Large-scale low-noise wind tunnel completed.
	Jul. 01	Yamanashi Maglev Test Center opened.
	Jul. 01	Railway Technology Promotion Center opened.
1997	Mar. 21	First railway design engineer examination administered.
	Apr. 03	Vehicle running tests started on the Yamanashi Maglev Test Line.
	Jun. 01	The RTRI joined UIC.
	Sept. 03	RTRI Technical Forum was held.
1999	Oct. 19-23	World Congress on Railway Research 1999 (WCRR '99) held at the RTRI.
2000	Mar. 09	The Committee for the Evaluation of the Technological Feasibility of Maglev commented that the JR Maglev has the practicality for ultra-high speed mass transportation system.
	Apr. 01	RTRI's Master Plan "*RESEARCH 21*" started.
	Jun. 28	Japan-Korea joint research started (forerunner of the current Japan-China-Korea joint research).
2002	Mar. 19	Current-collection testing facilities improved to perform testing at 200 km/h.
2003	Mar. 31	Rail Advisor Program established at the Railway Technology Promotion Center.
	Dec. 02	The world speed record of 581 km/h for a manned train (MLX01) attained on the Yamanashi Maglev Test Line.
2004	Oct. 14	Railway Technology Promotion Center won the Japan Railway Awards' Special Award for 2004.
	Oct. 23	Niigata Chuestu earthquake (participation in recovery support activities).
	Nov. 16	Two-train crossing test at a relative speed of 1026 km/h on the Yamanashi Maglev Test Line.
2005	Mar. 11	The Committee for the Evaluation of the Technological Feasibility of Maglev commented that the key technology for practical application has been established.
	Apr. 01	New Master Plan (*RESEARCH 2005*) formulated.
	Nov. 02	New test car introduced.
2006	Apr. 26	Running test of fuelcell railway vehicle succeeded.
2007	Aug. 08	Accumulated running distance of the Maglev trains reached 600 thousand kilometer at the Yamanashi Maglev Test Track.
	Oct. 25	A battery-driven, energy-recycling light-rail vehicle opened to the Public.

Recognition Record

Date	Award Winner	Sponsoring Organization	Award	Accomplishment
Apr. 6, 2007	Kimitoshi ASHIYA	Nikkei Business Publications, Inc.	Nikkei BP Technology Award, Construction Section	Development and Operation of an Emergency Earthquake Announcement System that Informs of about the Occurrence of an Earthquakes
Apr. 6, 2007	Tadao TAKIGAMI	Japan Society of Mechanical Engineers (JSME)	JSME Young Engineer Award	A Method of Reducting Vertical Bending Vibration in Railway Vehicle Bodies
Apr. 6, 2007	Takehisa TAKAISHI	Japan Society of Mechanical Engineers (JSME)	JSME Young Engineer Award	A Method of Evaluating the Dipole Sound Component in Consideration of Object Shapes in Aerodynamic Sound
Apr. 17, 2007	Yoshitaka MURONO	Minister of Education, Culture, Sports, Science and Technology	Young Scientist Award	Application to the Prediction of Seismic Motion and Measures to Protect Against Earthquakes Using a Mathematical Physics Method
Apr. 17, 2007	Kaoru ONO	Minister of Education, Culture, Sports, Science and Technology	Science and Technology Award, Development Section	Development of a Jetting Device for Cerajet Adhesion Improvement Materials
Apr. 29, 2007	Isao OKAMOTO	Prime Minister	Medal with Purple Ribbon	Development of Bolsterless Bogie for Shinkansen Electric Vehicle
May 23, 2007	Railway Technical Research Institute	Japan Techno-Economics Society	Letter of Thanks	Distinguished Service
May 24, 2007	Masahiro SHINODA, Masaru TATEYAMA	Japanese Geotechnical Society (JGS)	JGS Paper Award in 2006	Reliability-Based Seismic Deformation Analysis of Reinforced Soil Slopes
May 24, 2007	Railway Technical Research Institute	Japanese Geotechnical Society (JGS)	JGS Technological Achievement Award in 2006	Design and Execution of Aseismic Reinforced Embankments on Projected Shinkansen Lines
May 25, 2007	Masayuki KODA, Hidetoshi NISHIOKA	Japan Society of Civil Engineers (JSCE)	JSCE Technological Development Award in 2006	Development and Construction of Sheet-Pile Foundation Combining Footing with Sheet-Piles
May 25, 2007	Tenko FUKUDA	Japan Railway Rollingstock & Machinery Association	Prize for Excellence	Trends of Failure in Electronic Equipment for Vehicles and Measures against such Failure
May 26, 2007	Takuya URAKOSHI	Japanese Association of Groundwater Hydrology	Promotion Award	Estimation of Pore Pressure Field and Hydraulic Properties of Sub-sea Formation at Submarine Groundwater Discharge Area
Jun. 1, 2007	Osamu NUNOKAWA, Tomoyasu SUGIYAMA	Reliability Engineering Association of Japan	Promotion Award	Decision-Making Methodology for Measures Against Slope Disasters in Railways Utilizing the Risk Assessment Method
Jun. 15, 2007	Tomoki WATANABE	International Electrotechnical Commission (IEC)	IEC 1906 Award	Vital Work for TC9 Activity
Jun. 27, 2007	Disaster Prevention Technology Division	East Japan Railway Company	Letter of Thanks	Improvements in the Shinkansen Early Earthquake Detection System
Jun. 29, 2007	Yasuaki SAKAMOTO	Central Japan Railway Company	Letter of Thanks	Contribution on Improvement of Superconductive Magnet Technology
Jul. 13, 2007	Tatsuya NIHEI	Japan Concrete Institute	Promotion Award, 29th Concrete Engineering Annual Meeting	Influences of the Repair Method on Member Characteristics of RC Pillars Subjected to Bending Damage
Jul. 19, 2007	Shogo MAMADA	Japan Society of Mechanical Engineers (JSME)	Research Promotion Commendation for Environmental Engineering General Symposium	Development of Soundproof Rail Materials
Jul. 27, 2007	Fuminao OKUMURA	Asian Civil Engineering Coordinating Council (ACECC)	Appreciation for Contribution to ACECC	Distinguished Contribution to ACECC
Aug. 30, 2007	Keisuke SATO, Naoto FUKUMURA	The Operations Research Society of Japan	SSOR Best Presentation Award	Crew Rescheduling Problems during Time Table Disruption
Sept. 6, 2007	Noriko FUKASAWA, Naoki MIZUKAMI, Hiroshi MATSUBARA, Ryuji TSUCHIYA	Forum on Information Technology (FIT), Promotion Committee	FIT 2007 Paper Award	Evaluation of a Guidance System for the Visually Impaired

Date	Award Winner	Sponsoring Organization	Award	Accomplishment
Sept. 16, 2007	Masashi MIWA	Japan Society for Industrial and Applied Mathematics	Paper Award	Paper Presented in the Japan Journal of Industrial and Applied Mathematics
Oct. 26, 2007	Yasufumi SUZUKI	Japan Society of Mechanical Engineers (JSME)	Achievement Award in Commemoration of the 110th Anniversary of JSME	Distinguished Service
Nov. 3, 2007	Shunichi KUSUMI	Japan Electric Association	Shibusawa Award	Contribution on the Safety Improvement of Electric Facilities
Nov. 7, 2007	Yasushi HISAMIZU	Promotion Foundation for Electrical Science and Engineering	Electrical Science and Engineering Promotion Award	Development and Practical Application of a Feeding Transformer for a New Connection (Roof-Delta)
Nov. 7, 2007	Yoshinobu NAKAMICHI	Promotion Foundation for Electrical Science and Engineering	Electrical Science and Engineering Promotion Award	Development and Commercialization of Apparatus for a Regenerative Electric Power for DC Electric Rolling Stock Using an Electric Double-Layer Capacitor
Nov. 13, 2007	Kenji SUZUKI	International Superconductivity Technology Center	General Manager Award	Realization of Lower AC Loss in Yttrium-based Divided Wire Coils
Nov. 14, 2007	Masahiro SHINODA	5th International Symposium on Earth Reinforcement	IS KYUSHU 2007 The Best Presentation Award	Seismic Stability of Reinforced Soil Structure Constructed after the Mid Niigata Prefecture Earthquake
Nov. 15, 2007	Hiroo YAMAZAKI	Japan Fluid Power System Society	The Best Presentation Award	A Speed Servo-Brake for Railway Rolling Stock Using Model-Matching Control
Nov. 23, 2007	Yoshiki MIYAZAKI	Japan Society of Applied Electromagnetics and Mechanics (JSAEM)	MAGDA (Magnetodynamics) Conference Best Presentation Award	Basic Study of Room-Temperature Magnetic Refrigeration System
Nov. 28, 2007	Takaki MATSUMARU	International Geosynthetics Society	Certificate of Merit	Investigation on the Vacuum Compaction Process in the Execution of Large-Scale Fill-up Structures in Soft Ground / Verification of the Effectiveness of Fill-up Testing
Nov. 30, 2007	Keisuke MATSUMOTO	Society of Materials Science, Japan	Certificate of Merit	Strain Distribution Measurement of Austenite Stainless Steel Welds
Feb. 12, 2008	Keita ABE, Masayuki KODA	Japan Society of Civil Engineers (JSCE)	Paper Award	JSCE Earthquake Engineering Proceedings, 2007
Mar. 17, 2008	Yoshiki SUGAHARA	Japan Society of Mechanical Engineers (JSME)	Excellent Paper Presentation Award	Reduction of Vertical Vibration in Railway Rolling Stock Using Damping Control of Primary and Secondary Suspensions
Mar. 31, 2008	Hisashi TARUMI	Japanese Geotechnical Society (JGS)	JGS Medal for Distinguished Service	Distinguished Service

Industrial Properties

	Independently Owned	Jointly Owned	Total
Patents	1163	996	2159
Utility Models	0	5	5
Designs	48	9	57
Total	1211	1010	2221

(as of Mar. 31, 2008)

Number of Foreign Patents

Number of Registered Patents	Number of Countries Where Patents are Registered
49	128

(as of Jan. 31, 2008)

RTRI Report

Vol. No.	Titles
Vol.21 No.4 Apr. 2007	**Special Features: Transport Information Technology** REVIEW: Recent Research Topics of Transport Information Technology PAPERS: Development of Train Operation and Passenger Flow Simulator PAPERS: Evaluation Method of Robustness for Train Schedules PAPERS: Evaluation of Guidance System for Visually Disabled PAPERS: Providing Forecasted Information on Disturbed Train Operations to Passengers PAPERS: Information Filtering System for Station Staffs in Disrupted Train Operations PAPERS: Development of a Railway Accident Report Supporting System PAPERS: Development of Facility Management System for Tsukuba Express PAPERS: Seat and Mode Choice Models of Passengers and its Application PAPERS: Reduction Effect of Environmental Load with Shinkansen Service Section Extension PAPERS: Environmental Effectiveness by the Freight Modal-shift based on Improving Conventional Railway Station
Vol.21 No.5 May 2007	**Special Features: Human Factors** REVIEW: Characteristics and Potential of the Human Scientific Approach in Railway Transport PAPERS: Developing an Educational Program for Producing a Good Safety Climate in Workplaces PAPERS: Human Factor Analyzing Technique to Improve Safety Management PAPERS: Experimental Study on Evaluation of Mental and Physical Condition based on Uttered Voice PAPERS: Behavior Analysis of Passengers on Bench Seat in a Train Collision PAPERS: The Calculation Method of the Number of Ticket Vending Machine Installation According to the Passenger Flow PAPERS: Supports to be Installed in the Space for the Passenger with Reduced Mobility in Commuter Trains PAPERS: Appropriate Sound Level of Broadcasting on Station Platforms under Noisy Environment REVIEW: Review of Studies on Intentional Control and Monitoring for Accident Prevention
Vol.21 No.6 Jun. 2007	**Special Features: Track Technology** REVIEW: The Progress of 20 Years Track Technology and its Course in the Future PAPERS: Development of Improved Glued Railjoint for Insulation PAPERS: Development of Point Guard to Reduce Maintenance Labor Force PAPERS: Prediction of Plastic Deformation of Ballasted Track by Cumulative Damage Model PAPERS: Study on Applicability of Short Fiber Reinforced Concrete to Concrete Track Slabs PAPERS: Effects of Non-Uniformity of Subgrade Stiffness on the Deformation Characteristics of Concrete Roadbed PAPERS: A Design Method for Asphalt Pavement under Heavy Wheel Loads in Freight Container Yard PAPERS: Adjustment of Sampling Locations for Inspected Datasets to Observe Variation of Track Geometry with Time PAPERS: A Study of Ultrasonic Inspection and Durabillity Test for Rail Bond Joints PAPERS: Development of Friction Moderating System for Wheel/Rail Interface
Vol.21 No.7 Jul. 2007	**Special Features: Vehicle Technology** REVIEW: Recent Technology for Rolling Stock PAPERS: Development of Oil Damper Test Equipment Capable of Simulating Actual Conditions of Railway Vehicles PAPERS: Bending Vibration Suppression of Railway Carbody by Damping Force Control of Axle Damper PAPERS: Vertical Vibration Suppression of Railway Carbody by Damping Force Control of Air Spring PAPERS: Evaluation of Crack Propagation Property on the Wheelseat of Axles for Narrow Gauge Line Vehicles PAPERS: Reduction of EMI from Traction Circuit with Installing Shielded Cable PAPERS: Temperature Rise Estimation of Totally-Enclosed Traction Motor Considering PAPERS: Calculation System of Energy Consumed for Diesel Railcars PAPERS: Wheel Wear and Vehicle Dynamics Characteristics of New Type Commuter Train

Vol. No.	Titles
Vol.21 No.8 Aug. 2007	**Special Features: StructuresTechnology** REVIEW: Status-Quo and Perspective of Research and Development on Structures Technoloby PAPERS: Influence of Alkali Aggregate Reaction on Shear Strength of RC Deep Beams PAPERS: Evaluation of Applicability of Concrete-Filled Tubular Steel Members to Piles PAPERS: Full-Scale Loading Test of the Sheet-Pile Foundation snd Seismic Design Method PAPERS: Examination of Influence Evaluation of the Existing Structure by Netghboring Construction of the Cast-in-Place Pile PAPERS: Proposal of Guideline for Judgment of Adjacent Level on Adjacent Construction of Existing Tunnels PAPERS: The Simulation for the Result of Cut and Cover Tunnel Inspection PAPERS: Distribution of Loosening Earth Pressure to Occur in Element Jacking Method PAPERS: An Inverstigation into the Actual Condition and Subjective Evaluation Test of Acoustical Environment in Railway Station PAPERS: Evaluation Method for Air Pressure Variation and Deterioration of Station Facility Members Caused by Higt-Speed Train Passage in Stations PAPERS: Response of SDOF System to Non-Stationary Excitation Considering Stochastic Characteristics of Phase Spectrum
Vol.21 No.9 Sept. 2007	**Special Features: Maglev Technology and its Application** REVIEW: Recent Technical Development on Superconducting Maglev System PAPERS: Reduction of Vibrations in Maglev Vehicles Using Active Primary and Secondary Suspension Control PAPERS: Fundamental Study on the Effect of Low Frequency Sound on Ride Comfort PAPERS: Durability Evaluation Tests of Mold Resin for Ground Coil PAPERS: Analyses of Harmonic Resonances in Feeding Circuit for MAGLEV PAPERS: Force Density of Magnetic Bearing using Superconducting Coils and Bulk Superconductors PAPERS: Non Destructive Test of White Etching Layer on Rail Surface by SQUID PAPERS: Development of Cooling System for Superconducting Traction Transformer that used Pulse Tube Refrigerator INTERNATIONAL CONFERENCE REPORT: Report on MAGLEV'2006
Vol.21 No.10 Oct. 2007	**Special Features: Power Supply Technology** REVIEW: Recent State of Researches on Power Supply Technology for Electric Railways PAPERS: Development of New Type Gap Arrester for Earth Fault Protection in AC Feeding System PAPERS: Development of High Resistance Grounding Fault Detector by Making Use of Load Currents PAPERS: Evaluation of Environmental Corrosion Degradation of Zinc-coated Stranded Steel Wire Used as Messenger Wire in SHINKANSEN Lines PAPERS: Evaluation of Salt Damage Corrosion Resistance of the Improved Material for Ears PAPERS: Development of Transition Structures between Overhead Rigid Conductor Line and Catenary-Type Contact Line PAPERS: Development of Simple Catenary Equipment used PHC Contact Wire for Shinkansen PAPERS: Measurement Method of the Pantograph Contact Force in Overhead Catenary System PAPERS: An Aerodynamic Effect of Turbulent Flow to Rear-Side Pantograph Caused by Front-Side Pantograph Shield
Vol.21 No.11 Nov. 2007	**Special Features: Signalling & Telecommunications Technology** REVIEW: Recent Research and Development in Railway Signalling and Telecommunications Technologies PAPERS: A Study of Quantifying and Reducing Electric Resistances between Rail and Wheel PAPERS: Development of Degital ATC for Shinkansen using Non-insulated Track Circuit PAPERS: Development of Image Processing Method for Detection of Suspicious Acts PAPERS: Experimental Evaluation of Simple Construction Mehtod for Radio Networks along Railway Lines PAPERS: Evaluation of Prediction Control Considering Conditions of Signalling System PAPERS: An Application of a Formal Technology to an Appraisal of a Train Control System with a Wireless Communication System PAPERS: Application of Formal Methods to Signalling Systems using Techniques based on Stepwise Refinement REVIEW: Trends of International Standardization of Electromagnetic Compatibillity in Railway Systems

Vol. No.	Titles
Vol.21 No.12 Dec. 2007	**Special Features: Railway Dynamics** REVIEW: New Measuring Methods for Phenomena Peculiar to the Railway System PAPERS: A Fundamental Study on Effect of Rust upon Adhesion Coefficient between Wheel and Rail PAPERS: Development of Low-Cost and Precise Measurement Techniques for Distribution of Absolute Settlement of Ballasted Tracks PAPERS: Development of "U-DOPPLER" Non-Contact Vibration Measuring System for Diagnosis of Railway Structures PAPERS: A Study of Ground Vibration of Ballasted Ladder Track Induced by High Speed Train PAPERS: A Study on Train-Running Quality during Earthquake for PC Extradosed Bridge PAPERS: Numerical Simulation Study on How to Improve Bogie for Raising Running Safety during Seismic Vibration PAPERS: Analysis on Running Safety of Train Quaked by Seismic Motion PAPERS: Method to Evaluate Structure of Low-Frequency Aeroacoustic Noise Source Generated by Shinkansen Pantograph
Vol.22 No.1 Jan. 2008	**Special Features: Disaster Prevension Technology** REVIEW: Recent State of Research and Development Concerning Disaster prevention Technology PAPERS: Resolution of Frost-Phenomena Adherent to the Overhead Lines and a Study on Prediction Method of Overhead Line Frosting PAPERS: Scale Model Tests To Reproduce Wet Snow Flying Phenomenon During Train Running PAPERS: A Statistical Method to Predict the Shape and Scale of an Embankment Collapse under the Rainfall PAPERS: A Method to Predict the Change of the Water Level on the Slope Surface Layer Considering the Topography PAPERS: Method of Evaluating Stability During Earthquake and Design for Quakeproof Reinforcement for Masonry Walls PAPERS: Estimation of Strong Ground Motion in Wide Area Based on Coupling of Stiffness Matrices Method and FEM Analysis PAPERS: Verification Analysis Considered the Effect of Rainfall of the Railway Embankment Seriously Damaged in the Mid Niigata Prefecture Earthquake PAPERS: Study on Evaluation of Environmental Pollution Caused by Heavy Metal Elements in Natural Ground
Vol.22 No.2 Feb. 2008	**Special Features: Vehicle Technology** REVIEW: Recent R&D Status on Rolling Stock Strength PAPERS: High Speed Performance and Construction of Independent Wheel System Bogie with DDM PAPERS: An Air Spring Model Considered Characteristics of Non-linear Damping for Vertical Motion PAPERS: Suppression of Vertical Vibration in Railway Vehicles by Damping Control of Axle Dampers and Air Springs PAPERS: Development of a System to Reduce Interior Noise of Railway Vehicle Using Piezoelectric Material PAPERS: Development of a Hybrid Electric Vehicle with the Power Supply from Dual Voltage Trolley and On-board Battery and Its Power Flow Control PAPERS: Energy-saving Performance and the Principle of a Measure for Boosting the Input Voltage of the Traction Inverter Using the Energy Storage Equipment PAPERS: Application of Non-destructive Inspection Methods to CFRP Flexible Plate for Traction Motor Shaft Coupling PAPERS: Development of Wheel Load and Lateral Force Measurement Processing System Combining Intermittent and Continuous Measurement Methods PAPERS: Evaluation of Fuel Consumption and Energy Efficiency with a Railway Test Vehicle Powered by Fuel Cells REVIEW: Basic Study on Deregulation for Use of Hydrogen and Hydrogen Transport by Railway
Vol.22 No.3 Mar. 2008	**Special Features: Seismic Technology for Railway Structures** REVIEW: Recent Research and Development of Structural Seismic Technology PAPERS: Characteristic of Repaired Columns of RC Rigid-frame Viaducts Damaged by Earthquakes PAPERS: Evaluation Method of Limit State of Collapse for Viaduct Columns Subjected to Repetitive Seismicity PAPERS: Nonlinear Hysteresis Model of RC Members Considering Strenght Degradation by Cyclic Loading PAPERS: Evaluation of the Seismic Load Carrying Capacity and the Hysteresis Model of Cast Iron Bearing PAPERS: Quakeproof Reinforcement Method of Brick Pier Against Big Earthquake Supported Old Foundation PAPERS: Series of Analyses and Experiments for Lateral Resistance and Dynamic Behavior of Batter Pile Foundation during Earthquake PAPERS: Experimental Study on Influence of Seepage Water on seismic Resistance of Embankment PAPERS: Estimation of Engineering Bedrock Using Some Geophysical Exploration to Evaluate Earthquake Ground Motion

More information is available on the following website.

URL: http://www.rtri.or.jp/infoce/rtrirep_E.html

Quarterly Report

Vol. No.	Titles
Vol.48 No.2 May 2007	Verification Tests of Energy Storage System for DC Electrified Railways using EDLC Characteristic Evaluation of Corrosion of Aluminum-based Rigid Conductor Line Features of Contact Wire Wear and Measures for Local Wear on Simple Catenary with Copper-Steel Contact Wire Development of Basic System on ATS-X with Continuous Surveillance Pattern Advanced Inspection System of Tunnel Wall Deformation using Image Processing Estimation of Occurrence Frequency of Lightning Overvoltages in Wayside Signalling Equipment Application of HTS Current Lead for Superconducting Magnet Development of Electromagnetic Vibration Test Apparatus for Ground Coils Applied to Maglev System Method for Controlling Frictional Heat inside Superconducting Coils
Vol.48 No.3 Aug. 2007	Method for Running Safety Assessment of Railway Vehicles against Structural Vibration Displacement during Earthquakes Historical Earthquake Damage to Tunnels in Japan and Case Studies of Railway Tunnels in the 2004 Niigataken-Chuetsu Earthquake Method of Calculating Frost Penetration Depth for Railway Subgrade Considering Thermal Characteristics of Multilayer Materials Evaluation Method of Train Operation Control under Gales Considering Temporal Fluctuations of Wind Velocity Evaluation of the Structural Integrity of Bridge Pier Foundations Using Microtremors in Flood Conditions Simplified Analysis Method of Deformation to Design Quakeproof Reinforcement for Masonry Walls Verification of Wavelength-Fixing Mechanism for Rail Corrugation Caused by Multiple-Wheel Interaction Estimation of Wear and Strain of Contact Wire Using Contact Force of Pantograph Evaluation of Countermeasures against Differential Settlement at Track Transitions Train-Running Quality during Earthquakes and Its Improvement for Railway Long Span Bridges
Vol.48 No.4 Nov. 2007	Evaluation Method of Robustness for Train Schedules Application of Mobile Internet to Railway Maintenance Work Environmental Load Reduction Due to Modal Shift Resulting from Improvements to Railway Freight Stations Development of Rail Noise Isolating Material Inventory Analysis of Transport in Japan Based on Input-Output Tables Wear Reduction of Wheel Specimens by Duplex Shot Peening in Dry Rolling/Sliding Contact Tests Wind Tunnel Tests on Reduction of Aeroacoustic Noise from Car Gaps and Bogie Sections Flow Control on Pantograph with Air Intake and Outlet Vegetation Control through Selective Elimination of Large-size Weeds on Embankments Using Growth Retardant
Vol.49 No.1 Feb. 2008	Development of Oil Damper Test Equipment Capable of Simulating the Actual Conditions of Railway Vehicles Suppression of Vertical Vibration in Railway Vehicles by Controlling the Damping Force of Primary and Secondary Suspensions Development of Totally Enclosed Permanent Magnet Synchronous Motor Reduction of EMI from Traction Circuit Using Shielded Cable Development of Wheel/Rail Friction Moderating System(FRIMOS) Adjustment of Sampling Locations for Inspected Datasets to Observe Variation in Track Geometry over Time Study on the Applicability of Short Fiber Reinforced Concrete to Precast Concrete Slabs for Slab Track Behavior Analysis of Passengers on Bench Seat in Train Collision Human Factor Analysis Method for Improving Safety Management Supports to be Installed in Multi-Purpose Area on Commuter Trains Used by Passengers with Reduced Mobility

More information is available on the following website.

URL: http://www.rtri.or.jp/infoce/qr_E.html

Railway Technology Avalanche

No.	Titles
No.18, Jun. 2007	International Activities of the Railway Technical Research Institute RTRI-SNCF Railway Research Seminar and Franco-Japan Railway Technology Symposium Friction Moderating System To Reduce Wheel/rail Interface Problems at Sharp Curves Mechanisms Causing the Deterioration of Concrete Tunnel Lining A Method To Assess the Safety of Complex Electromagnetic Fields Behavior Analysis of Seated Passengers at a Train Collision
No.19, Sept. 2007	Developing New Technologies for Solving Various Railway Issues Development of a Testing Machine with a Large Tunnel Lining Model Development of Superconducting Magnetic Bearings Reduction of Carbody Vertical Bending Vibration by Controlling the Primary Suspension Damping Force Running Test of Experimental Fuel Cell-Driven Car Development of Sheet-Pile Foundation Combining Footing with Sheet-Piles
No.20, Dec. 2007	Brightening the Future of Railways Using New Technologies Publishing English Digests of Design and Maintenance Standards for Railway Structures and Commentaries New-Type Transformer for AC Feeding Systems New Railway Roadbed Design Development of a Method of Pinpointing Trackside Spots That Are Subject to Strong Winds Estimation of Occurrence Probability of Lightning Overvoltages on Wayside Signalling Equipment
No.21, Mar. 2008	Japanese Railways and Globalization A Report on International Standards Meetings Recently Held in Japan -JISC-CENELEC Information Exchange Meeting and LIM Kyoto Meeting- Development of High-Temperature Superconductor Magnets Capable of Generating a High Magnetic Field U-Doppler, a Non-contact Vibration Measuring System for Diagnosis of Railway Structures Development of a Method to Predict Passenger Numbers upon Resumption of Train Service Computational Simulation Method of Evaluating Aerodynamic Sound Sources

More information is available on the following website.
URL: https://entry.rtri.or.jp/index.html

RTRI Lecture

Main Theme: "Changing the Maintenance of Railways" -New Ideas and Application of Technology

Date: Nov. 8, 2007 (Thu) 10:00 to 16:50

Venue: Yurakucho Asahi Hall (Yurakucho Marion 11th Floor)

Titles	Speakers	Affiliates
<Special Lecture> Optimal Use of Maintenance and Sensing Technologies for the Prevention of Disastrous Accidents in Social Infrastructures	Yozo FUJINO	Professor, Department of Civil Engineering, University of Tokyo
<Keynote Lecture> Current Status and Prospects of R&D in Railway Maintenance	Masao UCHIDA	Executive Director, RTRI
Maintenance of Structures	Shinji KONISHI	Director, Structures Technology Division, RTRI
Maintenance of Tracks	Makoto ISHIDA	Director, Track Technology Division, RTRI
Maintenance of Electrical Facilities	Shinichi HASE	Director, Power Supply Technology Division, RTRI
Maintenance of Rolling Stock	Hiromichi ISHIDUKA	Director, Vehicle Structure Technology Division, RTRI
Maintenance Support System	Koichi GOTO	Director, Transport Information Technology Division, RTRI

Monthly Presentations

Date	Number	Main Theme	Venue
Apr. 18, 2007	200th	Recent Signalling & Telecommunications Technology	Oval Hall (Osaka)
May 14, 2007	201st	Recent R&D on Structural Technology	Kogakuin University (Shinjuku)
Jun. 18, 2007	202nd	Recent R&D on Disaster Prevention Technology	Kogakuin University (Shinjuku)
Jul. 10, 2007	203rd	Recent R&D on Power Supply Technology	Kogakuin University (Shinjuku)
Aug. 22, 2007	204th	Dynamics of Railway Systems During Earthquakes	Kogakuin University (Shinjuku)
Sept. 21, 2007	205th	Recent R&D on Rolling-stock Technology	STeC Information Building (Shinjuku)
Oct. 18, 2007	206th	Recent R&D on Transport Information	Oval Hall (Osaka)
Dec. 20, 2007	207th	Studies of Human Factors for Enhancing Railway Safety	Kogakuin University (Shinjuku)
Jan. 15, 2008	208th	Recent Studies on Structural Technology	Kogakuin University (Shinjuku)
Feb. 14, 2008	209th	Recent Studies on Environmental Engineering	Kogakuin University (Shinjuku)
Mar. 21, 2008	210th	Recent Track Technology	Kogakuin University (Shinjuku)

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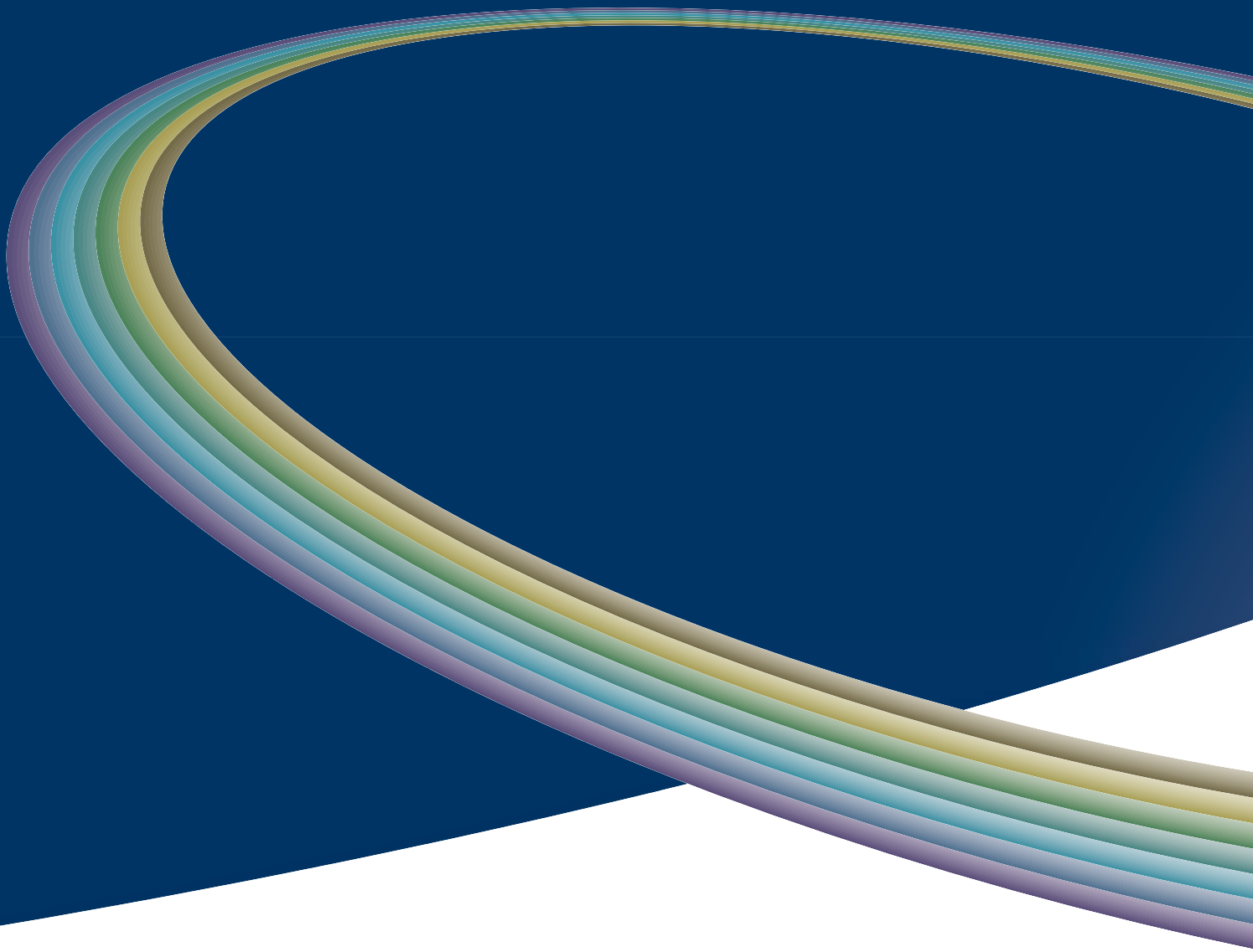

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