AIMING FOR THE WORLD'S NUMBER-ONE HIGH-SPEED RAIL SYSTEM
ADVANCED TECHNOLOGY DEVELOPMENT

OVERVIEW

The business environment in which JR East operates is changing rapidly because of the diversification and increasing sophistication of customer needs, Japan's aging population and low birth rate and intensified competition due to deregulation. As part of its adaptation to this environment, JR East established the Research & Development Center of JR East Group in December 2001. The Center serves as an integrated organization for JR East's R&D activities, which were previously dispersed. Through this center, JR East carries out research and development to create new services, further enhance safety and reduce costs.

TOPICS

Frontier Service Development Laboratory

The Frontier Service Development Laboratory uses a "soft side" approach to the creation of services based on customer perspectives such as market research with particular emphasis on social surveys and forecasting.

To bring in new knowledge and ideas, the Laboratory has organized intellectuals and cultural figures into a number of research groups and has studied the consumption behavior of 10,000 people at and around stations. The results of this work have already been applied to Green Car (first class) services on the Tohoku Shinkansen trains since the opening of the Hachinohe extension. The Frontier Service Development Laboratory also develops the IT systems used to expand *Suica* functions and provide information at stations.

At the "hard side" level, it is working to reduce the cost and time required to develop service provision spaces, such as artificial ground. Initiatives include the development of technology to allow projects to be carried out in narrow spaces between tracks, and methods to complete projects quickly by utilizing nighttime hours when no trains are running.

Advanced Railway System Development Center
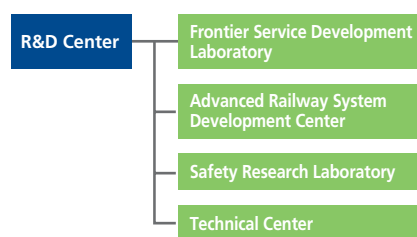
Aiming to make the Shinkansen the world's number-one high-speed rail system, the Advanced Railway System Development Center develops in-train and ground-based facilities to improve running performance, environmental friendliness, passenger comfort and other aspects of train operations.

It is also conducting trials of the *AC (Advanced Commuter) Train*. This next-generation train will bring enhanced transportation reliability, upgraded passenger services, cost reduction, barrier-free access and environmental friendliness.
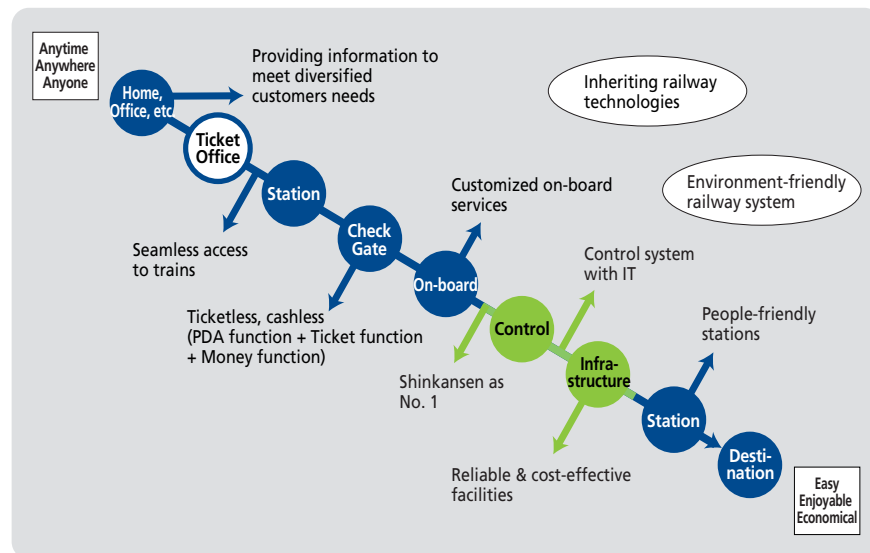
As part of JR East's energy conservation efforts, the Advanced Railway System Development Center is working toward the realization of the *NE (New Energy) Train* concept, which includes the use of trains powered by fuel cells in the future. A hybrid railcar combining an engine and storage battery cells is currently under development.

It is also developing a new operational control system with capabilities that include the distribution of information to crews and automatic schedule forecasting. The aim of this system is to ensure rapid

RESEARCH & DEVELOPMENT CENTER OF JR EAST GROUP

R&D Center	Frontier Service Development Laboratory
	Advanced Railway System Development Center
	Safety Research Laboratory
	Technical Center

NEW RAILWAY CONCEPT e@train

recovery after disruptions and to construct a reliable transportation system.

The Advanced Railway System Development Center is also responsible for the development of the *ATACS* train control system. Train location has been detected by using track circuits. In the new IT-based train control system *ATACS*, a train detects its location by itself.

Safety Research Laboratory

Research and development activities by the Safety Research Laboratory are targeted toward improvements in the overall safety of railway systems. The goal is to eliminate accidents that could cause passenger casualties and eradicate fatal accidents involving JR East staff or contractors' staff. Specifically, it is conducting research into the prevention of derailments, collisions and other disasters. Human factors are also included in the scope of this research.

The Laboratory is currently testing a newly developed fall detection system based on imaging technology. It will allow trains to be stopped immediately if a passenger falls from a station platform.

Technical Center

The technology development at the Technical Center is focused on further cost reduction and achievement of the world's number-one maintenance technology. The Technical Center is working to optimize technology relating to the interfaces between wheels and rails, and between overhead lines and pantographs. Another goal is the development of easily maintained rolling stock and facilities, and countermeasures against the effects of snow.

Since July 2002, it has been using a network system linking it with group companies and related departments of the parent company. This system supports two-way sharing of information about technology and workplace problems.

e@train

JR East has combined new technological advances and anticipation to create the e@train concept, which represents the newest and best form of "what the railway of the future should be." This concept is continually updated with the latest advances. The research and development activities of JR East are dedicated to the realization of this concept through the application of accumulated technology resources and leading edge advances to the development of safe, reliable and comfortable railway.

The "e" in e@train stands for "enjoyment," "environmental friendliness," "entertainment," and "economy."

Intellectual Property Management

JR East is working to maximize the potential of its accumulated technology resources. Patent administration operations, which were previously divided among multiple departments, have been integrated, and educational programs are being implemented, particularly in the area of business model patenting. By March 2003, JR East had made a cumulative total of 1,937 patent applications (333 registered) and 608 trademark registration applications (589 registered).

Research & Development Center of JR East Group

NE (New Energy) Train

Note: *ATACS* means Advanced Train Administration and Communication System. This new railway system uses on-board computers and mobile communications technology to communicate by wireless rather than through track-based circuits. It is being developed as a low-cost way of achieving various control functions, including train separation control, route selection and level crossing control.