

Special
feature

Innovation to help realize our Long-Term Vision

In the JR-West Group's Long-Term Vision 2032 and Medium-Term Management Plan 2025 we focus on using innovation to achieve our long-term vision. Towards that end, we are working to create innovation-friendly environments and collaborating with various partners. Through innovation, we will create both social and economic value by helping to address local and social issues through our business as a company that coexists with communities.

1 Innovation examples

(1) Development and introduction of new limited express Yakumo rolling stock

In order to further improve the service level and transport quality of the Yakumo limited express, which connects the San-in and Sanyo areas, we have introduced the new 273 series of railcars. We have developed and put into practical use Japan's first on-board controlled natural pendulum, thereby significantly improving ride comfort. This system continuously compares the on-board curve data with the data from the traveling position, and tilts the vehicle body at the appropriate time. In addition, the space between seats has been increased to the same degree as in the Shinkansen, making the interior even more comfortable. With the introduction of this rolling stock, we will provide an even safer and more comfortable travel experience.



New limited express Yakumo rolling stock

(2) Start of operation of multifunctional railway heavy machinery

In order to address the social issue of a shrinking workforce, we are working to improve productivity and safety by mechanizing railway equipment maintenance. The multifunctional railway heavy machinery was developed in collaboration with Man-Machine Synergy Effectors, Inc. and Nippon Signal Co., Ltd. with the aim of creating highly versatile work machinery capable of handling the diverse equipment maintenance performed by humans at elevated heights. Since July 2024, Nishinihon Electric System Co., Ltd., a JR-West Group company, has been using it for railway equipment maintenance on commercial lines. Through mechanization, we will be able to eliminate heavy work at heights that previously required manual labor, thereby improving productivity and safety, while creating a work environment in which anyone can work on infrastructure maintenance regardless of gender or age.

■ Overview of multifunctional railway heavy machinery



- Interactive and intuitive operation
- Equipped with various tools to handle a variety of tasks
- People can perform work at an elevated height while they remain on the ground
- Easy-to-learn operational techniques
- Excellent functionality and expandability (versatility)
- Improved work safety

(3) Technological development aimed at self-driving of the Hokuriku Shinkansen

In order to build a sustainable railway system for the future, we have been conducting demonstration testing of self-driving functions at the Hakusan Depot of the Hokuriku Shinkansen since fiscal 2023 and are working on developing the core technologies necessary for self-driving.

Additionally, in April 2023, we signed an MoU (memorandum of understanding) with JR-East on technical cooperation to realize self-driving. We are working together to examine self-driving technology based on the Hokuriku Shinkansen cars (E7/W7 series).



Hokuriku Shinkansen W7 series



On-site test run

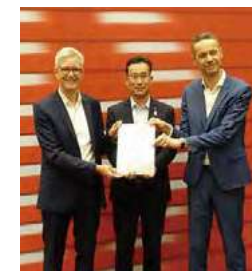
(4) Practical application of self-driven caravan BRT (bus rapid transit)

We are in the midst of acquiring technologies for self-driven caravan BRT systems, which we aim to offer to the general public in future. This will realize next-generation mobility services in the form of sustainable local transportation that is linked to city development. Based on the results of the demonstration testing conducted on a dedicated test course (in Yasu, Shiga Prefecture) starting in October 2021, we began collaborating with the city of Higashihiroshima, which is considering introducing BRT, in fiscal 2023 and conducted the first demonstration testing on public roads in Higashihiroshima in November 2023 with the aim of putting it into practical use. This testing was the first of its kind in Japan in two areas: self-driving of articulated buses on public roads and caravaning of driverless buses on public roads. Test-ride events for the public were held in January and February 2024 and attracted a lot of attention. We will continue these sorts of efforts to find solutions to social issues.



(5) Technical collaboration with overseas partners

We are pursuing technical collaboration with overseas partners in order to foster innovation through the incorporation of advanced technologies from around the world and to contribute to the development of the world's railways with the technologies we have cultivated. In May 2024, we signed an MoU on technical exchange with Swiss Federal Railways, and, in August, we signed an MoU on technical cooperation with RTRDA, a railway research institute in Thailand. We will keep a close eye on global technological trends as we strive for sustained growth while keeping pace with the rest of the world.



(6) Generative AI-driven digital transformation in railway operations

● Development of a station equipment failure search app (Mirai app)

In the event of a malfunction in the mechanical equipment at stations, we have developed an app that uses generative AI to search past cases to identify the cause of the malfunction and provide details on how to deal with it, so that station staff can resolve the problem themselves without having to contact a call center or arrange for maintenance personnel. When station staff enter a description of the problem, the AI will display suggested countermeasures on the app screen and also display similar past incidents. This will contribute to reducing downtime in customer services as well as easing the workload of those involved.



Screenshot of the Mirai app

● Development of a guidance assistance app for station staff (Copilot for Station Staff)

We are currently developing an AI assistant that will complement the experience and knowledge of station staff in order to quickly find the information they need when they need it for information provided to customers at stations that requires them to refer to product information, such as sales rules and promotional tickets. (Testing planned at some stations in fiscal 2025.) This will reduce the waiting time per customer, and by analyzing app usage logs, it will be possible to identify heavily inquired products and sales rules. We will consider using this information to develop educational curricula for providing passenger guidance that is in line with actual usage as well as to review systems for greater efficiency.



Screenshot of Copilot for Station Staff (under development)

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2 Open innovation initiatives by the entire JR-West Group

The JR-West Group is actively working to address society's problems by leveraging the technology, know-how, and external networks that we have built up through our innovation activities to date. For example, the technology and know-how we possess include image analysis and table data analysis developed by our data scientist employees, while group companies possess the technology and know-how for vehicle maintenance and modification, mechanical and electrical equipment maintenance and repair, aesthetic maintenance of stations and vehicles, and safety and technology transfer-related education and training. Our technology, know-how, and networks are also being utilized by external businesses, including other railway companies, that are facing common challenges.

By having JR-West and JR-West Group companies work together to come up with ideas and solutions, we will be able to capitalize on our dual role as both a technology user and vendor and, thereby, provide solutions that are more tailored to

our customers' concerns. To that end, we have formed teams that include not only people with diverse backgrounds and experience from JR-West, but also employees seconded from group companies. We are also building collaborative systems with companies outside the Group and actively disseminating information through our JRW Innovation Platform website, an information sharing platform for external parties.

We will continue to accelerate the resolution of issues, both internally and externally, through a comprehensive approach that brings together the strengths of the Group.

(1) Examples of problem-solving in the railway industry

Among the many and diverse examples of our initiatives, we are working to address the problems of mainly small and medium-sized railway operators by acting as an intermediary between them and operators who are considering updating or transferring their rolling stock, while we carry out everything

from design to modification work, repairs, and maintenance. In addition, we are building continuous points of contact across the railway system, such as by promoting the Crossing Gate-Lite project, which aims to improve the safety of the many remaining Class 4 railroad crossings (crossings with no gates or alarms) across Japan, to other small and medium-sized railway operators.

(2) Examples of problem-solving across different industries

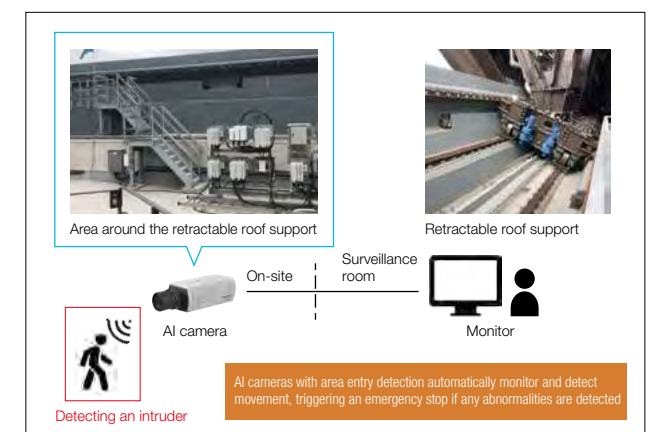
We are developing our own proprietary image analysis AI that achieves high quality and high security based on the vast amount of learning data obtained from security cameras inside stations. We also own systems and technologies that realize CBM (condition-based maintenance), which uses our own failure prediction AI to constantly monitor equipment conditions so that maintenance is performed only when necessary. Using these in-house technologies and solutions, we are working to address the problems of various partners. Examples include improving the safety and efficiency of opening and closing the retractable roof at the Es Con Field Hokkaido stadium, as well as improving the efficiency of nonwoven fabric inspection at Toyobo MC Corporation.

Problem-solving at Es Con Field Hokkaido Improving visitor safety using image analysis AI technology

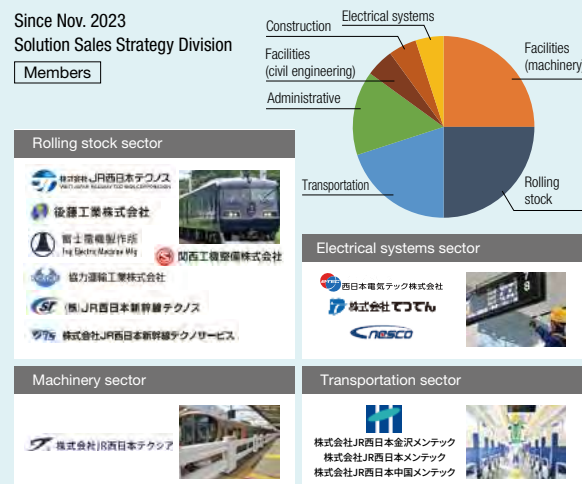
Background
The stadium's retractable roof is opened and closed several times a day, and staff have to be deployed each time to ensure the safety of visitors. We recognized this as a problem and proposed the use of our image analysis AI, which contributes to even greater safety and streamlined operations.



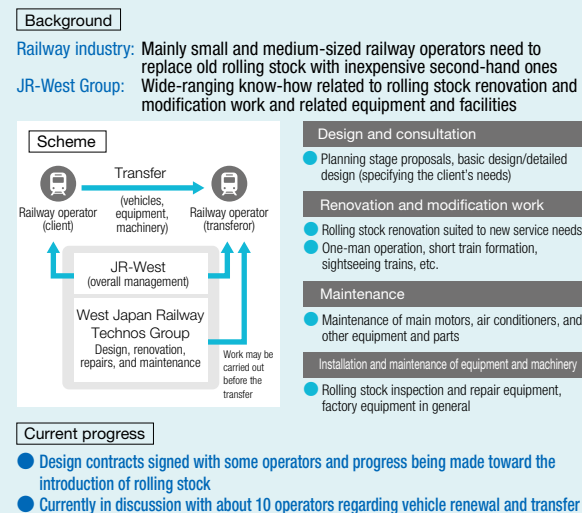
Retractable roof



Leveraging a wide variety of technologies and know-how to pursue profit-making



Rolling stock repurposing and renovation



3 Intellectual property strategy

(1) Basic approach

As we need to collaborate with various partners to create innovation in order to solve increasingly sophisticated business challenges, it is important to develop an intellectual property strategy that guarantees results in the form of intellectual property to be utilized to the fullest.

With our focus on both "defensive" intellectual property, which contributes to the safe and stable sustained operation of railways, and "offensive" intellectual property, which has high social applicability and the potential to contribute to the creation of new value, we are pursuing the acquisition of intellectual property while increasing the visibility of our own intellectual property system. We are also working to increase the turnover in our intellectual property by promoting the creation of intellectual property through employee education and collaboration with technology development management, while also sorting out intellectual property that we have not yet capitalized upon.

Through these efforts, we aim to build a strong intellectual property portfolio that is linked to our business and that contributes to realizing our Long-Term Vision.

(2) Number of intellectual property rights acquired and examples of acquired rights

The following is the status of our patents (inventions), utility models (devices), and designs (including pending applications).

This includes seven intellectual property rights currently held or pending overseas.

Number of intellectual property rights acquired

| Patents | Utility models | Designs | Total |
|---------|----------------|---------|-------|
| 300 | 3 | 19 | 329 |

(As of March 31, 2024)

Major IP

| | |
|----------------|--|
| Patents | <ul style="list-style-type: none"> Self-driven caravan BRT system Bridge deformation inspection system (BBMAPS) Ticket gate equipment failure prediction AI system Driving notification transmission system Twilight Express Mizukaze rolling stock and bathtub Shinkansen derailment prevention system, vehicle fall prevention system Platform screen doors (Osaka Station Umekita area) Rope-type platform gates LED signal flares |
| Utility models | <ul style="list-style-type: none"> Wall foundation structure |
| Designs | <ul style="list-style-type: none"> GranClass seat operation display Movable gates (station platform screen doors) |

Examples of solution proposals offered to railway operators

AI guidance system



- Current progress**
- Numerous demonstration tests conducted tailored to the needs of transportation companies, local governments, etc.
 - Planning to capitalize on growing guidance-related needs leading up to Expo 2025

Crossing Gate-Lite



- Current progress**
- Interest from multiple railway operators outside our service area
 - Currently planning and finalizing development based on client needs