Railway Newsletter

Latest News on Japan Railways Group

Summer Edition 2015

JAPAN RAILWAYS GROUP
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1 . Continuously evolving railway network

Expansion of the Shinkansen network

JR East and JR West began the operation of Hokuriku Shinkansen in March. This has shortened the travel time by 1 hour and 19 minutes, connecting Tokyo and Kanazawa in 2 hours 28 minutes. Shinkansen between Tokyo and Nagano had already been in operation since 1997, and now an additional 228.1 km of railway tracks between Nagano and Kanazawa is also operational. There are 35 tunnels and 701 bridges on this line. The construction work was extremely difficult and took 23 years to complete. Tunnel construction was a battle against swelling pressure. It took 9 years to break through Iiyama tunnel, which is the third longest in Japan with 22.2 km, and as for the notorious Nabetachiyama tunnel of 9.13 km, excavation work took 18 years to complete. As the Shinkansen passes one of the heaviest snowfall areas of Japan, several advanced technologies have been put into use. They are a snow-melting method using a water sprinkler, a viaduct with snow-storing space where roadbed concrete was raised 75cm higher than usual and the snow is collected on the slab on the side of the track, and finally a viaduct with snow-storing space, where snow falls through the gap between the double noise barriers, onto the under-viaduct. In 7 years, railway tracks will be extended for approximately 113 km from Kanazawa to Tsuruga.

JR Hokkaido continues with the running tests for the Hokkaido Shinkansen (149 km), due to be fully operational next March. Running tests in all sections began in May, including in Seikan submarine tunnel, and the tests are also carried out where the newly

operational trains pass each other. Driver training will start in August. The Shinkansen will be ready to be fully operational after the second winter season running tests have been completed and the brake performance and so on have had their final check. The plan is to operate a section of another 212 km to Sapporo by 2030.

Proposing rail travel by luxury train

JR West has named the luxurious cruise train "Twilight Express MIZUKAZE". This train will make a tour of the west region of Japan and will be fully operational around March 2017. One can enjoy the rich history and culture of Kyoto, Matsue, Izumo, Miya-jima, as well as the beautiful nature of the original Japanese landscape, such as the Sea of Japan, Daisen, and the numerous islands of the Seto Inland Sea. All of which can be experienced within a carriage that has the excellent quality of a refined hotel that exudes relaxing nostalgia.
http://twilightexpress-mizukaze.jp/en/

JR East will begin to operate a luxurious cruise train "Shiki-Shima" (four seasons) around the same period,

which will make a tour of the eastern region of Japan. In addition, JR Kyushu has been operating a luxurious sleeper train “Seven Stars” since 2013, which makes a tour of the Kyushu area.
http://www.cruisetrain-sevenstars.jp/en/index.html

2. Developing a sustainable society

In pursuit of green energy

JR East has decided to install a wind turbine generator system in its own railway shelterbelt. This is the first time the company enters the wind turbine generation business. They plan to start construction this coming autumn and operation in the autumn of next year. The expected output and annual energy production of the above-mentioned wind turbine generator system is to be 2MW and 5800MWh, respectively. The electricity generated will be sold using the Feed-in Tariff (FiT). JR East has decided to invest in the new company and plans to develop a community-based business with local companies as partners. The aim is to achieve a power generation of 100MW by 2020 around the northern Tohoku region.

With regards to biomass power generation, JR East has established a joint enterprise with Sumitomo Group, which aims to be in operation from December 2017. The expected power generation capacity and annual energy production is to be 12MW and 85GWh, respectively. Timber from southern Aomori prefecture forest thinning and from the railroad shelterbelt will be used for its fuel. By taking advantage of the location that is close to the Hachinohe port,

imported palm kernel shells from Southeast Asia will also be used.

In addition, JR East has begun to excavate a well for an investigatory study into geothermal power generation in the northern Tohoku region, in cooperation with Obayashi Corporation and Kawasaki Heavy Industries, Ltd. With the grant from the Survey Project Expense for Geothermal Resource Development Subsidy Program by Japan Oil, Gas and Metals National Corporation (JOGMEC), there will be an excavation of a well approximately 2,000 m in length in a national forest in Aomori city by the end of October. Keeping in mind a possibility of a geothermal power plant operation in this region, a study of topography, quantity of water, water temperature, geological structure and so on will be carried out. Together with this excavation, biological research, ecosystem survey and monitoring survey on the neighboring hot springs are also planned.

JR East has already started developing photovoltaic power generation projects in 5 places, since February last year. JR West has also started the operation of the largest photovoltaic power plant in the Japan Railways Group (JR Group) since March. Power generation scale and the quantity of annual generation are 5MW and 5100MWk, respectively. All generated electricity will be sold to the local power company, with expected annual revenue of approximately 1.4 million euros.

2. 2 Energy-saving action

For the first time in the world, Railway Technical Research Institute (RTRI) has succeeded in running a test train on a commercial line, using a superconductive feeder cable. In this experiment, a superconductive feeder cable was installed to provide electricity in a substation of Izuhakone Railway, and one test train was operated in both directions. The main aim of this running test was to verify the fundamental technology of the connection of superconductive feeder cable to the actual commercial line facilities, system validation and so on for actual implementation. In the test, a 6m long superconductive feeder cable with a current carrying capacity of 2,080A was installed in a substation and incorporated into a feeder circuit. The transmission cable was cooled down to -200 ℃ with liquid nitrogen. Running test will continue on the commercial line for further development.

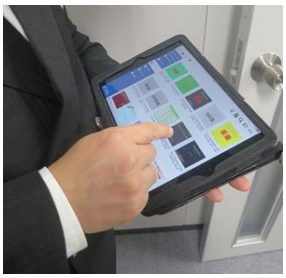
JR Kyushu has started operating a new commuter train specific for 1.5kV dc electrification section on the Chikuho line. The train has been designed with energy saving and a lower maintenance in mind and is considered to be a model train of the future. Damped wheels, where a rubber ring is sandwiched between the wheels to absorb vibration, a closed-type motor to reduce wind noise, as well as a rotary compressor have been adopted to achieve high noise reduction in the carriage. For environment reasons, LED lamps have been used for internal light and it is equipped with a permanent magnet synchronous motor to reduce the consumption of electricity. When compared to the 2 types of last generation train models, energy is saved by 43% and 15%, respectively. With regards to making it lower maintenance, as the motor is a closed-type, it prevents dust from entering and thus it is possible to be cleaned easily and only exchanging expendable supplies, such as bearings, is necessary. This can cut 90% of maintenance-related work in comparison to the last generation train models. JR Kyushu has a lot of

non-electrification sections and updating the diesel trains is next on the list. There are plans to introduce battery trains (currently under development) for the urban areas with short distance lines, hybrid trains for areas with flat and long distance lines, and diesel-electric trains for areas with long distance lines with ascent and descent.

3. Use of ICT for passenger information

Employee tools to support passengers

This year, JR West has provided in total of approximately 1,000 personnel (all drivers of the Shinkansen, conductors, and train crew) with iPads containing digitized manuals. The aim is to improve the trouble-shooting capability and also to provide better passenger information. These tablet devices are equipped with manuals for drivers and conductors, internally developed information translation tool, as well as a display application showing train status information in text, which is provided by the control center. Through the use of this communication function, real time train status information of other companies can be acquired and then provided to the passengers, or can speed up the identification of the cause by sharing an image or video footage that was taken during anomalies among all the parties concerned. JR West has been using tablet devices to provide information service by the station employees, and on conventional lines, smartphones are used to speed up providing information at times of abnormality and for evacuation guidance during a tsunami provided by the control center. As for JR East, they have, since last year, provided tablet devices not just for all the crew members of the Shinkansen and conventional lines, but also for all staff working on-site.



JR Shikoku has begun to use tablet devices to improve the service provided for overseas tourists, for which special attention is needed. Many have started to visit Shikoku, a region rich with untouched nature and long history, after train passes just for overseas tourists were introduced in 2012. Tablet devices can be used to provide up-to-date information, such as neighboring sightseeing spots and train schedules, and as they are equipped with an interpreter application, communication becomes possible with overseas tourists. An operator of multilingual interpreter service can be reached by a push of a button on the tablet device, and overseas tourists can receive interpreter service through the screen. Complicated demands, such as changing or refunding tickets can be quickly dealt with. Expansion of the Wi-Fi service is also in the pipeline.

Improvement of passenger service

JR East has been making improvements to receive rapidly increasing numbers of overseas tourists, especially as Tokyo Olympic and Paralympic Games are to take place in 2020. As a part of this preparation, JR East has released a smartphone app in English on their website, called "JR-EAST Train Info" (http://www.jreast-app.jp/en/), which provides information on trains and stations. Distinctive features

include being able to check delays and cancellations of trains on the major railway routes of JR East at a glance, as well as the service information of all other railway routes. In addition, maps of the main stations (approximately 150) and station information of available routes are displayed. For the Yamanote Line, the loop line in central Tokyo, congestion information and the temperature in each carriage of the operating trains can be checked.

Furthermore, JR East has started to offer free Wi-Fi service on the trains for overseas tourists on some trains of the Tohoku Shinkansen. Free Wi-Fi is already available in 41 stations in and around the Tokyo area within the JR East operating region.

4. Revival from the disaster

Service restored in succession on the tsunami-suffered routes

JR East suffered damages by the Great East Japan Earthquake of March 11, 2011, and operation was suspended immediately in a section of approximately 400 km, but restoration works advanced, and the damaged section was reduced to approximately 240 km by the end of last year. Furthermore, 2 railway sections in Miyagi, where tracks were swept away by the tsunami, were restored in succession this year and contribute to the region's revitalization.

On March 21st, the Ishinomaki Line (44.7 km), of which 5.2 km was relocated inland, resumed its full operation for the first time in 4 years. Onagawa Station of this section relocated 200 m inland and was raised by up to 7 m. Hot spring facilities and others were built in the station complex, and it is hoped to play a key role in the community development.



On May 30th, the Senseki line (49 km) resumed its full operation, after restoration works, such as relocating tracks and stations inland, were completed. A section of approximately 11.7 km of the JR Senseki line had been suspended, which links Sendai city to Ishinomaki city (second largest city in Miyagi). For the reopening of the entire line, eight 2-car diesel hybrid trains were newly added. They will be operated through sections of DC, AC, and of non-electrification.

Currently, there are 5 interrupted sections, but substitute transportation by bus in 3 of those affected sections is provided. Restoration work is also underway in the remaining 2 sections, and a part of it will resume operation in 2017.


5. Building a safer railway

Safety improvement on the platform

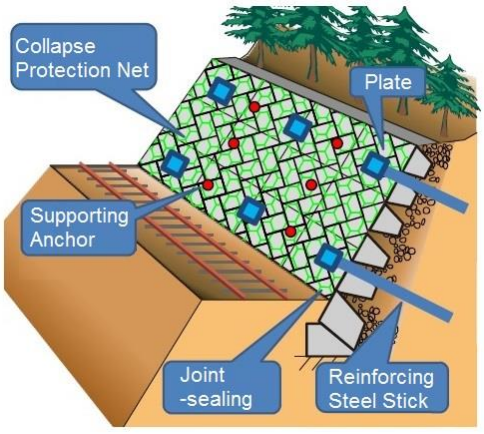
JR East has started the trials of the elevating platform screen door at some sections of Haijima Station. Support columns are installed at approximately every 4 m on a platform, where 3 bars connect them to build a screen for a 4-car train. When a train arrives, the screen elevates approximately 2 m, together with a part of the column. It resumes its original position after the train departs, to prevent falls onto the platform as well as contact with the train. JR East has already installed the conventional platform screen door on the Yamanote loop Line, on which only a single car model


runs. The platform screen door that is being tried out this time, however, is capable of coping with trains that have differing door positions.

JR West will begin to use the anomaly detection system on the platforms, which uses the image analysis technology of the cameras. When it automatically detects impairment in a passenger's walk, passengers sitting down for a long stretch of time or falling onto a track, it notifies station employees to prevent passenger falls and collisions with a train. There are 2 types of cameras – "remote security cameras" which utilizes the security cameras already in operation in the station concourses and on platforms, and "fall detection cameras" which will be newly setup above the tactile ground surface indicators, at the edges of the platforms. Remote surveillance cameras automatically detect passengers who are walking in a noticeably meandering manner or sitting down for a long stretch of time, and for prowlers leaving behind suspicious-looking objects. This is then reported to the security center, which undertakes constant remote surveillance. The characteristics of the fall detection cameras are that by using 2 lenses, they can three-dimensionally grasp the position of the objects. The cameras are setup approximately every 5 m, positioned downwards along the edge of a platform. Once they detect an anomaly, such as a fall of a passenger onto the tracks, the station office is alerted with sound and images. At the same time, emergency alarm light goes on to notify the drivers and the station employees on the platforms. In addition, if it is detected that somebody has gone over the tactile ground surface indicators onto the side of the railway tracks for more than a given length of time, an announcement is made by the loud speaker to draw attention.

Developing a method of seismically strengthening masonry retaining walls

The Railway Technical Research Institute (RTRI), in cooperation with JR East, has developed a simple method to seismically strengthen existing masonry retaining walls. A shaking table test using a scale model was carried out where, firstly, collapse prevention net was pulled tightly and fixed onto a masonry retaining wall and then natural ground enforcer was poured onto it, in a method to assure stability of the backing ground. As a result, a promisingly highly effective earthquake resistant reinforcing structure was confirmed, even against large earthquakes, equivalent to that of the Great Hanshin-Awaji Earthquake of 1995. Until now, basic way to seismically strengthen masonry retaining walls was to insert the reinforcing structures such as stick-shaped rolled steel to the natural ground behind the retaining wall, and at the same time, an additional reinforced concrete was fixed onto the retaining wall, to make a continuous wall with high rigidity. The construction was then on a massive scale, where the issues of costs and constraints needed attention. Thus a method was developed where a net, which is fixed to the front part of stone-piling by supporting anchor, is used to prevent the stone-piling breaking loose, which was the cause of the general collapse of the masonry retaining wall. Furthermore, as the net transmits the resistance of the separately placed reinforcing structures to the whole retaining wall, the additional reinforced concrete on the masonry retaining wall would no longer be necessary.



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