

World's first full-height platform screen doors developed through open innovation



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The West Japan Railway (JR WEST) Group and Nabtesco have jointly developed the world's first full-height platform screen doors.

Vice President Keijiro Nakamura of JR WEST and Seiji Takahashi, President of the Accessibility Innovations Company talked about the open innovation process used to develop the full-height platform screen doors, the vision set for the "Umekita Area" of Osaka Station, significance of the "JR WEST LABO" as an experimental space for innovation, and the outlook for open innovation.

Making the "Umekita Area" of Osaka Station a "station of the future"

Takahashi: Please again briefly describe the concept of the "Umekita Area" of Osaka Station.

Nakamura: In the lead-up to Expo 2025 Osaka, Kansai,

Japan, we are implementing a project to make the "Umekita Area", located in the north (kita) area of Osaka Station, a JR WEST "station of the future" for the Kansai region.

In the "Umekita Area", which we regard as a center for the "JR WEST LABO", we are conducting experiments to concretize the technological vision of JR WEST, with an eye to developing even more advanced safety systems

by fusing the real and digital worlds while meeting the challenge of providing customers with value that increases their satisfaction.

Specifically, we are promoting co-creation through open innovation with a range of advanced companies, including those in the entertainment and software industries, in way that is similar to Silicon Valley. To make the "Umekita Area" incorporating the LABO center a "station of the future," we have been carrying out demonstrations to introduce a face recognition system at the ticket gates, AI-based guide robots, customized guide services for individual passengers, and guide services for people with visual impairments. We will thereby provide new value in the Area going forward.

Developing a world-first platform screen door unit by thinking outside the box

Takahashi: Let me ask you about the "Osaka Station's new Umekita platform" opened in March 2023.

Nakamura: We relocated the existing freight railway underground and established a new platform for express trains linking Kisei, Kansai International Airport and Kyoto. In the future, the platform will also be used for trains running on the Naniwasuji Line and the Nankai Line, and so we needed to develop and install platform screen doors that would be suitable for a range of train cars. Moreover, because freight trains will run underground, it is necessary to deal with the train wind effect. To meet these requirements, we planned to develop and install full-height platform screen doors and asked your company, which has a proven track record for such doors, to collaborate with us in a co-creation project.

Takahashi: When we were first contacted by your company for the project in the spring of 2017, we were unable to promise you that we would be able to develop a platform screen door unit that could be used for various train cars, as there were many technological problems to be solved. One year later, however, your company proposed a concept for a new platform door unit. Generally, waist-high type platform screen doors are installed into the floor. However, you proposed that a platform screen door unit, which is composed of multiple doors and a door pocket, be hung from the ceiling to make it possible to slide the unit left and right. It really was an out-of-the-box idea and we were impressed by the passion and dedication you demonstrated in trying to come up with an innovative door system.

We are proud of ourselves as a pioneer of platform screen doors, and we decided to draw on our expertise and

resources to engage in the co-creation project.

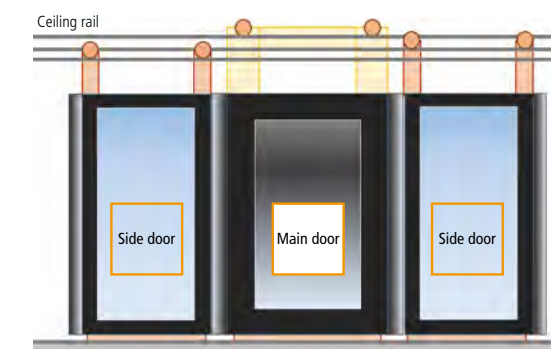
Your company, West Japan Railway Techsia Co., Ltd. and Nabtesco all worked together for the development of the door unit and faced a range of challenges in the development process. In particular, the heavy weight of the unit posed a problem. We at Nabtesco, also by thinking outside the box, changed the design from a structure consisting of "two side doors supported by the main door" to one consisting of "each of the main door and side doors being supported separately by being hung from the ceiling rail" to reduce the weight and distribute the load of the door unit, including the doors and the supporting structure, and to simplify the overall design. As a result, we were finally able to have a clear outlook for the project.

The platform door unit is composed of one main door and two side doors. A total of 50 units are now lined up on the platform, and by controlling their respective main and side doors, you can easily change the locations of the openings. In order to control the doors, however, we had to meet a range of challenges. It was especially difficult to slide the adjacent side doors together without creating a gap between them. By tossing new ideas around among the three companies, we were finally able to meet this challenge. Specifically, we installed electromagnetic locks between the side doors to have the doors pulled closely together by the sliding main door.

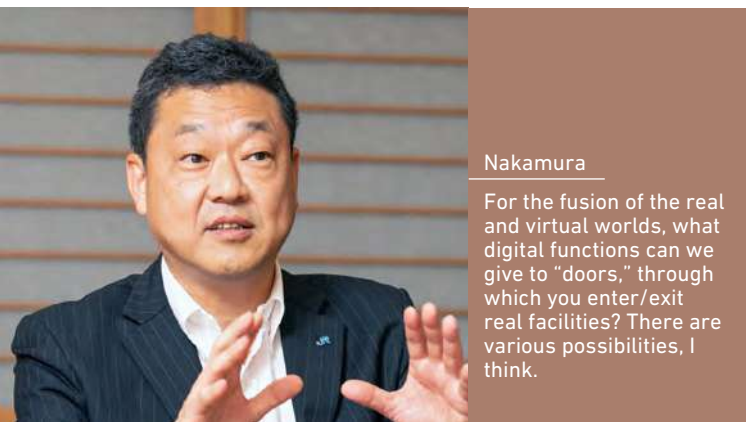
Nakamura: In 2019, I saw the prototype doors at Nabtesco's Konan Plant. I am grateful that you were able to develop the doors within a short time frame. After the development, we also faced difficulties when installing the doors.

Takahashi: We paid special attention to ensure safety, as the doors differed from conventional platform screen doors in terms of structure and movement. Giving first priority to ensuring the safety of passengers, even after

● Distributing the load by hanging the main and side doors separately from the ceiling rail



By controlling the unit composed of a main door and side doors, you can freely locate the openings. Platform screen doors are usually installed into the floor, but these doors are hung from the ceiling, which helps distribute the load and has led to the reduction of the door unit weight and the simplification of its structure.



Nakamura

For the fusion of the real and virtual worlds, what digital functions can we give to “doors,” through which you enter/exit real facilities? There are various possibilities, I think.

mass production had started, we changed the design to add a sensor to the door unit. We thus avoided making any compromises. For the installation of the door units, we confirmed the details with West Japan Railway Techsia, including the installation procedures and criteria, so that the door units would be installed with the precision we specified. Through the concerted effort of the three companies, we were able to achieve high safety & reliability as well as a beautiful design for the door unit.

Nakamura: We had only about one month for the trial run of the trains after the railroad track adjustment work was completed for the opening of the platform. All staff made a concerted effort to adjust the schedule and carry out checks on a range of train cars and multiple sets of cars to increase the reliability of the opening/closing operation of the door units as well as sensors mounted on the units. We were able to make functional improvements as planned within a short period of time. We faced various hardships, but Nabtesco completed all its tasks despite the tight schedule. Since the opening of the platform, we have been able to operate the door units with no major problems.

The “Umekita Area” of Osaka Station attracted a lot of attention due to the introduction of a face recognition system at the ticket gates and the installation of the full-height platform screen doors, and soon after the opening of the platform, the number of users, including visitors to the Area, amounted to 30,000 people per day. We expect that the number of passengers will further increase after the completion of the major facilities in the “Umekita Area” and the opening of the Naniwasuji Line.

Takahashi: We were able to meet a range of challenges by collaborating with JR WEST. Especially for the pursuit of safety, we learned a lot from the project.

Speeding up open innovation through the JR WEST LABO

Takahashi: How will JR WEST accelerate open innovation?

Nakamura: JR WEST has previously tended to attribute importance to doing everything independently, but we are in a new age. We need to be flexible and adopt excellent technologies also from outside the company. In the past we were sometimes unable to receive good proposals because we failed to communicate the challenges we were facing and what it would take for us to meet them.

We will change our attitude and search for co-creation partners to embrace challenges through the “JR WEST LABO”. We are eager to make use of our capital and human resources to grasp promising business opportunities.

It is important for us to fuse the real and digital worlds for the railroad business so that we can serve individual customers in a more attentive manner. To this end we are enhancing our WESTER app for customers. With regard to digitalization and virtualization, I hear some people opposed the idea of broadcasting sumo matches on TV as it would mean fewer live spectators at the Ryogoku Kokugikan sumo hall. On the contrary, however, sumo actually became more popular, bringing more spectators to the hall every day. Similarly, I think we can increase the number of passengers by making use of digital technologies to add new functions to our stations.

Takahashi: The COVID-19 brought digitalization forward, including with online meetings and online selling. However, I think it is still important for people to be able to physically touch things and have hands-on experiences in their daily lives, and stations represent a place that can combine the digital and real worlds.

Doors can be an “entrance” to bridge the real and virtual worlds

Nakamura: Also, for tourism, we have started to create a “virtual Osaka Station.” Having a virtual experience of traveling will encourage people to make trips in the real world.

How can we increase the public’s curiosity and interest in traveling? We used to have separate reward programs for customers in our railroad, hotel and retailing businesses but this spring we integrated the programs into the “WESTER point” rewards program. We will also enhance the provision of digital information through WESTER and provide users with convenient interactive

services while giving them “points” as special rewards, thereby contributing to increasing the attractiveness of western Japan and expanding exchange opportunities in the region.

Takahashi: I hear you will add an electronic financial settlement function to “WESTER”, which I think is appealing for those visiting Japan from overseas, as it will make it unnecessary for them to buy actual tickets or exchange money. In the future, it might become possible for hotel guests to automatically complete the check-in procedures by simply passing through the entrance door.

Nakamura: Yes, indeed. For the fusion of the real and virtual worlds, what digital functions can we give to “doors,” through which you enter/exit real facilities? There are various possibilities, I think.

Takahashi: You need to pass through a door to enter a facility. Stations are a starting point for lots of journeys and many people go there. Automatic doors could play additional new roles as entrances to various facilities. In our automatic door business, we are implementing a range of initiatives by creating digital technologies for the launch of new businesses, including those related to digital signage and ads. Going forward, I would like to foster co-creation with JR WEST also in the automatic door business.

Nakamura: The functions served by stations will change over the next five to 10 years. For example, passengers still need to take some action to pass through the ticket gates. The face recognition system introduced to the “Umekita Area” of Osaka Station will become a standard system in the near future. It is one of our innovation themes to make our services even more convenient for customers.

However, ensuring safety will continue to be our first priority. Platform screen doors are a social good and through the barrier-free fare system launched on April 1 this year, our passengers are now sharing the cost of making our facilities barrier-free, and we therefore need to speed up the barrier-free promotion measures even further.

Developing innovation leaders while also meeting social challenges

Takahashi: We will also create more opportunities to interact with start-up companies and experts to foster innovation. Moreover, we will listen to the opinions of end users and make innovative proposals to meet social challenges, such as the labor shortage and the need for decarbonization.

This June, we launched a new business promotion department within the Accessibility Innovations Company to develop businesses for next-generation automatic doors and in peripheral areas and to provide remote maintenance services based on the use of IoT technologies.

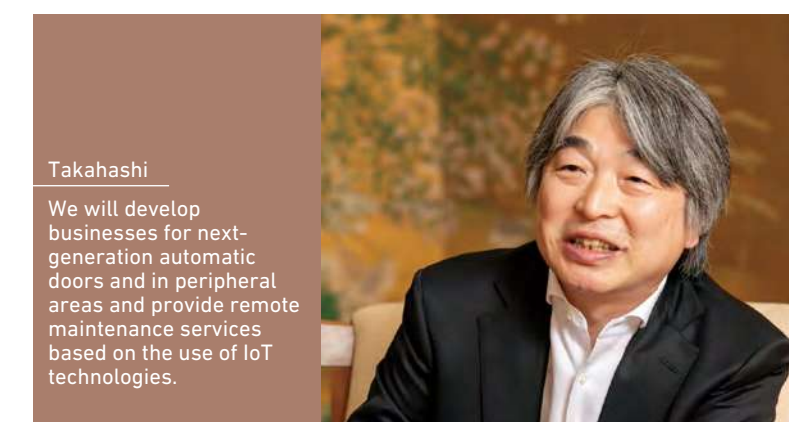
I also think it is important to provide younger employees, who will lead innovation in the future, with workplaces where they can conduct activities in comfort. To this end, we must create a corporate culture that allows employees to fail. I hear from young employees at our company that they were able to freely propose ideas and express their opinions in the co-creation project with JR WEST.

Nakamura: At JR WEST, we also give first priority to safety, and it is true that employees tend to try and avoid failure. However, we need to allow young engineers to be adventurers if we are to become a truly innovative company.

In the project, we were able to innovate largely because the young team members felt comfortable and had the freedom they needed. They were striving passionately to achieve the targets, which I believe has given them great confidence.

Going forward, we will continue to work for the solution of social issues and will generate and deliver innovations for the decarbonization of our society and for the SDGs, for which we would like to embrace challenges with Nabtesco.

Takahashi: We will take measures to contribute to the project that you are implementing to create attractive local communities. Thank you for today.



Takahashi

We will develop businesses for next-generation automatic doors and in peripheral areas and provide remote maintenance services based on the use of IoT technologies.