

# Series E7/W7 Shinkansen trains for the Hokuriku Shinkansen Line



In spring 2015, the operation of the Hokuriku Shinkansen bullet trains began between Nagano and Kanazawa using Series E7/W7 trains. The concept of these cars is the “The future with a Japanese sense of harmony”: Japanese traditional beauty can be seen here and there and has been combined with advanced technologies to create new value. The cars’ high performance allows them to cope with severe line conditions. Their functionality has been enhanced to improve customer services and reduce the amount of electricity consumed. We have manufactured and delivered five train sets to East Japan Railway Company and four sets to West Japan Railway Company.

## Introduction

The Hokuriku Shinkansen line is a bullet train line that connects Tokyo to Osaka via the Joshinetsu and Hokuriku areas. The operation between Nagano and Kanazawa started in the spring of 2015. Series E7/W7, jointly developed by East Japan Railway Company and West Japan Railway Company, was introduced as the Hokuriku Shinkansen trains.

## 1 Train formation

A single train set consists of a total of five units (12 cars): Three-car units including the lead cars and two-car units that consist of only middle cars (Fig. 1). Cars one to ten are Ordinary cars, Car 11 is a Green car, and Car 12 is a GranClass car.

New train names Kagayaki, Hakutaka, and Tsurugi are used in addition to the existing name Asama. The fastest

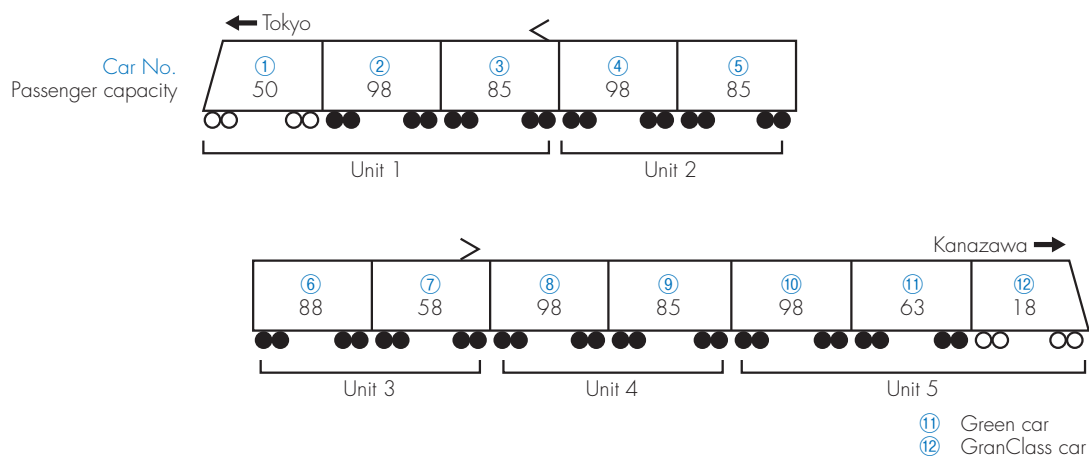


Fig. 1 Train formation

train, Kagayaki, runs from Tokyo to Kanazawa (approximately 450 km) in about two and half hours (maximum speed: 260 km/h).

## 2 Features

### (1) Design

Japanese people have established a culture in which Japanese style is being valued over a long period of time. We proposed and developed the design concept “The future with a Japanese sense of harmony” because we hoped that the Hokuriku Shinkansen trains would shoulder and tow the future for which such value is further developed.

#### (i) Exterior design

The appearance (shape) and colors were designed and developed under the theme “combination of tradition and future.” The smooth and flowing One-motion line (simple streamline front-end) represents a sense of speed giving it a tough and masculine look while maintaining environmental performance, for example, performance for reducing micro-pressure waves that are generated when a train passes through a tunnel.

The body colors of blue, copper, and white represent the combination of tradition and an image of the future. Blue represents the sky spread over the Hokuriku Shinkansen and copper is from copperware and inlaid work (Japanese traditional handicrafts) while white represents dignity and tranquility seen in Japan (Fig. 2).



Fig. 2 Lead car

### (ii) Interior design

GranClass cars were designed under the theme of “Harmony of passengers and space.” Green cars were designed under the “Harmony of style beauty” and Ordinary cars were under “Harmony of color.” They provide spaces in which much Japanese traditional beauty is harmonized (Figs. 3 and 4).

In addition, the vestibules of GranClass cars have red decoration plates with a motif of Japan’s four seasons (Fig. 5).

### (2) Facilities in trains

In order to improve customer services, all Western-style restrooms in the trains have warm-water washing features and all seats in Ordinary cars have electric outlets. In addition, only LED lights have been installed on the trains to reduce the amount of electricity consumed.

### (3) Switching power supply frequencies

Power supply frequencies need to be switched in the middle of the Hokuriku Shinkansen route, so the trains have equipment that can operate at both 50 Hz and 60 Hz.



Fig. 3 GranClass cabin



Fig. 4 Green car cabin



Fig. 5 Vestibule of GranClass car

#### (4) Performance on steep slopes

The Hokuriku Shinkansen line has multiple steep slope sections (30 ‰ per mill). The trains have power output and braking performance that can handle such slopes.

#### (5) Ride quality

The trains have full-active suspension systems (systems that use actuators to generate vibration that cancel the side-to-side rocking motions to control vibration optimally) and semi-active suspension systems (systems that change the damping force of the dampers to control vibration optimally) to control side-to-side rocking motion in order to improve ride quality.

## Conclusion

After the operation of the Hokuriku Shinkansen with these rains started, there continues to be a large number of passengers riding the train, so it has fulfilled its role as a major transport artery to Hokuriku.

In addition, the Japan Railfan Club gave a Blue Ribbon Award to the trains in 2015 because it valued the trains highly for their high level of safety and reliability secured even under severe line conditions and their excellent exterior and interior.

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