

Development of the Series N700 Shinkansen train

- Instillation of the body inclining system and energy conservation-



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1. Abstract

The series N700, which debuted on July 1, 2007, developed under the following three concepts. (Fig.1)

- (1) Fastest cutting-edge rolling stock
- (2) Superior comfort
- (3) Greater environmental compatibility

One of the most outstanding feature of the Series N700 is the body inclining system, which is introduced for the first time in Shinkansen. Safe and reliable operation of the system has been achieved by combining new technologies. (Fig. 2)

The N700 is also featured by greater energy conservation by reducing running resistance, using the body inclining system, which reduces the frequency of acceleration and deceleration, and increasing the number of cars with regenerative brake.

2. Outline of technologies

2.1. Body inclining system

As more than 300 trains are operated on Tokaido Shinkansen every day, Shinkansen trains are required highest reliability to achieve safe and stable operation.

To realize high reliability of the body inclining system, the Series N700 adopts a simple and light weight air-spring based inclining mechanism, which combines the new Automatic Train Control (ATC) technology capable of providing reliable high-precision position data, and the Train Control and Communication Network, a control transmission technology that simultaneously transmits position data digitally to number of cars over a long distance.

By introducing the system on the Tokaido Shinkansen, the operating speed at curves has been raised from 250km/h to 270km/h on standard curves with a radius of 2,500m.

It enables to reduce travel time between Tokyo and Shin-Osaka (515km) by five minutes, and improves riding comfort.

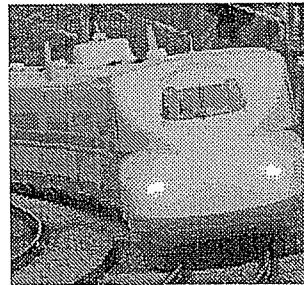


Fig.1 Series N700

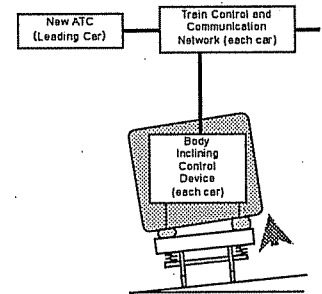


Fig.2 Body inclining system

2.2. Greater energy conservation

The reduction of energy consumption has been achieved by introducing the latest and refined technologies such as technologies to reduce running resistance, body inclining system, and power regeneration technology.

The body and undercarriage are designed in a thoroughly streamlined shape through the use of aerodynamically superior nose shape, cover-all hoods between all cars and bogie skirts to reduce air resistance by 20% compared to the Series 700.

The body inclining system also contributes to greater energy efficiency, by successfully reducing the frequency of acceleration and deceleration at curves.

The number of cars equipped with regenerative brake in a 16-car configuration has been increased from 12 (Series 700) to 14. The Series N700 employs a system in which the regenerative brakes on 14 cars cover all the breaking power required in normal operation, so as to promote the recycling of electrical energy.

Compared with the original Shinkansen train, the Series 0, the Series N700 is 32% more energy efficient, despite the fact that the maximum speed has been improved by 50km/h from 220km/h to 270km/h. If this comparison is based on a speed of 220km/h, there is 49% more energy efficient than the Series 0.

3. Conclusion

The Series N700 commenced commercial operation on July 1, 2007.

80 trainsets of the Series N700 will be introduced, and all "Nozomi" service will be operated by the Series N700 by the end of fiscal year 2011.

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