

JR Central Pavilion: Invitation to the Ultimate Surface Transit System The Superconducting Maglev Takes Off!

By Kigaku Yasumichi



Morizo Kicoro

Superconducting Maglev Linear Motor car

The superconducting magnetically levitated linear motor car, or Superconducting Maglev, is a revolutionary transit system. Unlike conventional trains, it does not come in contact with its guideway. Instead, the Maglev is levitated in the air above the guideway by the electromagnetic forces between superconducting magnets on board the vehicle and coils on the ground.

The Superconducting Maglev's origins can be traced back to 1962 to the research of a linear motor propulsion that targeted a 1-hour trip between Tokyo and Osaka, envisioning a next-generation ultra high-speed railway to follow the *Shinkansen* (bullet train). The first successful levitating run was conducted at the Railway Technical Research Institute in 1972. In 1977, a test track was built in Miyazaki, and in 1979 the first test vehicle, the ML-500, reached 517 km/h, the fastest speed ever recorded on a railway.

In 1989, the decision was made to build the Yamanashi Maglev Test Line, including tunnels, gradient and curves, and in April 1997, test runs were commenced on the line. Tests proceeded smoothly, with a manned test run achieving a speed of 552 km/h in April 1999, and in the following November,

two Maglev vehicles passed by each other in opposite directions at a relative speed of 1,003 km/h. In March 2000, the Maglev Practical Technology Evaluation Committee of the former Ministry of Transport said, "The Maglev has the practicability for an ultra high-speed mass transport system." A test run plan is being launched to verify long-term durability, to test technologies that can reduce costs and improve the aerodynamics, with the aim of further advancing the superconducting Maglev technologies in roughly five years from FY 2000.

A world-record speed of 581 km/h for a manned vehicle was achieved in December 2003, and in November 2004, a relative passing speed of 1,026 km/h for two vehicles traveling in opposite directions was achieved, with the total travel distance for the vehicle reaching 400,000 km. These and other developments helped establish the fundamental technologies required for a commercially viable line. Test rides were also conducted to allow people to experience the level of maturity of superconducting Maglev technology, and by November 2004, a total of about 85,000 people had enjoyed rides on the vehicles.

Special Pavilion to Be Established at High-Profile Location for Visitors from Japan and Overseas

Photo: Central Japan Railway Company



Superconducting Maglev 3D Theater with 800-inch Screen (image)

At the EXPO 2005, JR Central will set up a pavilion at a high-profile location that will grab the attention of visitors from around the world. Japan's cutting-edge Superconducting Maglev technology will be introduced at the JR Central Pavilion, which will serve as a springboard for implementing a next-generation railway.

Three-Zone Pavilion

The pavilion is entitled "JR Central Pavilion: Invitation to the Ultimate Surface Transit System," and its theme is "Superconducting Maglev takes off! – Beyond the threshold of existing surface transit systems." Visitors can experience firsthand the level of maturity of Superconducting Maglev technology, surpassing the boundary of conventional ground transit systems. The specific exhibits will use the approach of intellectual entertainment to introduce Japan's world-class cutting-edge superconduct-

Photo: Central Japan Railway Company



JR Central Pavilion

ing Maglev technology, promoting both the ultimate ideals and the actual reality of the technology. The pavilion is comprised of three zones: the Maglev 3D Theater, the Maglev MLX01-1 (the real Maglev Vehicle) and the Superconducting Technology Lab. The keywords for promoting the ultimate ideals of the technology at the Maglev 3D Theater are “excitement” and “high-impact spectacle,” while at the Maglev MLX01-1 zone, the keywords for promoting the actual reality of the technology are “firsthand experience” and “experiencing 581 km/h.” And at the Superconducting Technology Lab zone, JR Central will introduce the “Fun of Learning,” with a focus on understanding the technology and the fun of “intellectual entertainment.”

The real Maglev Carriage on display

The Maglev 3D Theater is the pavilion’s greatest attraction, where visitors can virtually experience the 500-km/h speed of the Maglev vehicles on a huge screen. Visitors will learn about railway history through a series of innovations leading up to the Maglev vehicles, technological developments and the social backdrop behind the Maglev. In the main 3D Theater, documentary footage of the Maglev on the Yamanashi Maglev Test Line will be presented in impressive Hi-Vision three-dimensional images and sounds on a 10m × 18m (800-inch) screen. This will allow visitors to experience the moment of levitation of the Maglev vehicles, the speeds of more than 500 km/h, and two vehicles speeding side by side. Many angles will be shown and highly-realistic sound effects will heighten the experience.

The Maglev MLX01-1 zone, the main exhibit in the pavilion, will feature the actual double-cusp shaped lead car (28-m-long) that achieved the world-record speed of 581 km/h during manned travel on the Yamanashi Maglev Test Line in December 2003. This will give visitors an exciting first-hand look which only the real thing can provide, including a vehicle fitted with superconducting magnets (the driving force of the Maglev), and the light-weight body that drastically cuts down on air resistance. Visitors can also view the interior of the Maglev.

The Superconducting technology Lab will introduce superconducting Maglev technology in an easy-to-understand manner. To emphasize the fact that the Maglev has already entered the practical application stage, the zone will introduce and explain the power and mechanism of Japan’s world-class cutting-edge technology through an actual demonstration of magnetic levitation and a demonstration of the launch of a flying object using the world’s highest performance superconducting magnets. Visitors can also learn about the course of development through the display of actual equipment used in the Maglev project.

Visitors can enjoy a real Maglev vehicle and the charm of superconducting Maglev technology to their heart’s content at the JR Central Pavilion. An invitation to the ultimate surface transit system is now available. **JS**

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