

RTRI Starts Verification of World's First Power Transmission For Commercial Line Operation Through Superconducting Feeding System

The Railway Technical Research Institute (RTRI) has been working on the research and development of the superconducting feeding system. We are now starting the technical verification of the world's first power transmission for commercial line operation through the system on the Sunzu Line (IZUHAKONE Railway Co., LTD.). We have been authorized by the government to use the system as a railway facility for this operational verification.

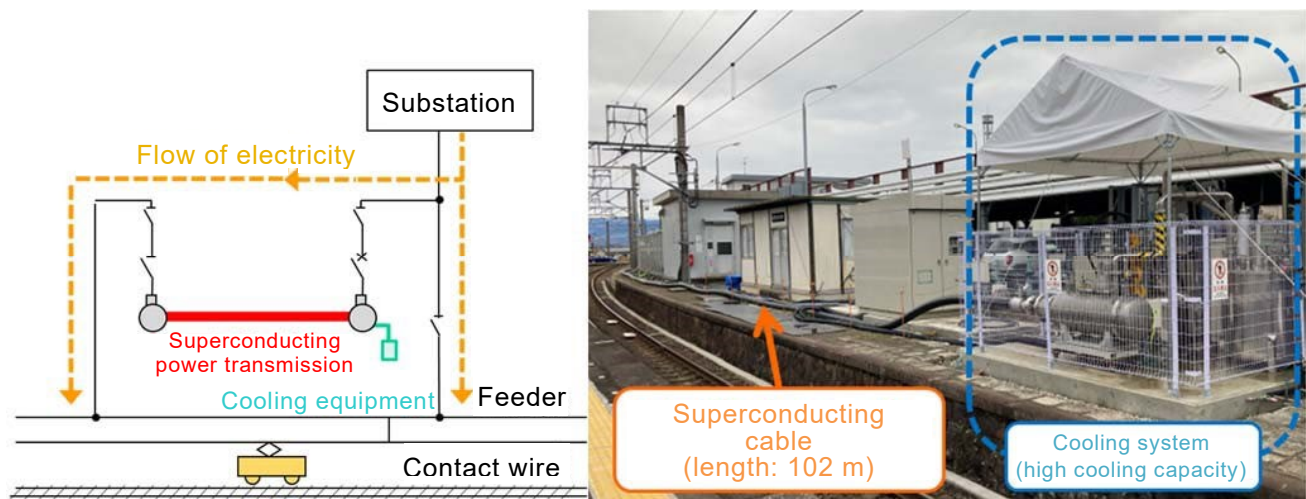


Fig. 1 Overview of Superconducting Feeding System

Superconducting feeding system and our previous and ongoing efforts

The superconducting feeding system supplies electricity required for train running to feeders and the like through superconducting line transmission using superconducting phenomena where electrical resistance is reduced to zero at or below a certain temperature. This system solves the present problems caused by electrical resistance during power transmission, including transmission losses and voltage drops. The system is expected to be an effective method promoting energy conservations through lossless power transmission and facility saving through consolidating and/or reducing substations.

The RTRI has been working on the development of this system since 2007 and has been conducting running tests both on the test tracks at the RTRI and actual railway lines. For full-scale commercialization and widespread use, it is necessary to identify and resolve issues

with the actual operation of the system, such as the applicability to the load carried by commercial vehicles, reliability of the system, and the like.

Overview of verification for commercial line operation

Period :

Scheduled from March 13, 2024 through the end of fiscal year 2024

Location:

At Ohito Station on the Sunzu Line (IZUHAKONE Railway Co., LTD.)

Overview:

A superconducting cable (length: 102 m) and a cooling system with a pump circulating a refrigerant and refrigerator (high cooling capacity) are installed with the system. Liquid nitrogen (at or below $-196\text{ }^{\circ}\text{C}$) is used as a refrigerant to maintain superconductivity. Currents of or above 3,000 A required for running tests on the main line are transmitted with zero electrical resistance and no losses. The system provides power to a total of 135 commercial vehicles per day, 67 inbound vehicles and 68 outbound vehicles.

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