

## High-Speed Test Facility for Pantograph/OCL Systems

AT RTRI, a world's highest level test facility for pantograph was completed (Fig. 1). This facility is capable of moving a pantograph at high speeds up to 500 km/h, powered with large current from trolley wire and assessing the performance of Shinkansen's pantographs. This machine will be used to develop a pantograph which has an excellent performance to keep contact with trolley wire and is capable of reducing contact loss. The mechanism of abrasion of pantograph contact strips and trolley wire will be analyzed with this machine as well.

### [Outline of the high-speed test facility for pantograph/OCL systems]

The high-speed rolling disk is capable of:

- reproducing the moving state of a pantograph of a high-speed train running up to 500 km/h (Fig.1)
- capable of reproducing contact-loss arcing between a pantograph and trolley wire and increase in the temperatures of parts by applying electrical current (maximum 600 V, 1000 A) to the pantograph and trolley wire, (Fig. 2)
- reproducing lateral and vertical displacement of trolley wire (Fig.3)
- conducting tests with real trolley wire (Fig.3)
- reproducing vertical vibration of a train vehicle by shaking the pantograph stand vertically
- conducting tests under the temperatures and humidities controlled by air-conditioning device

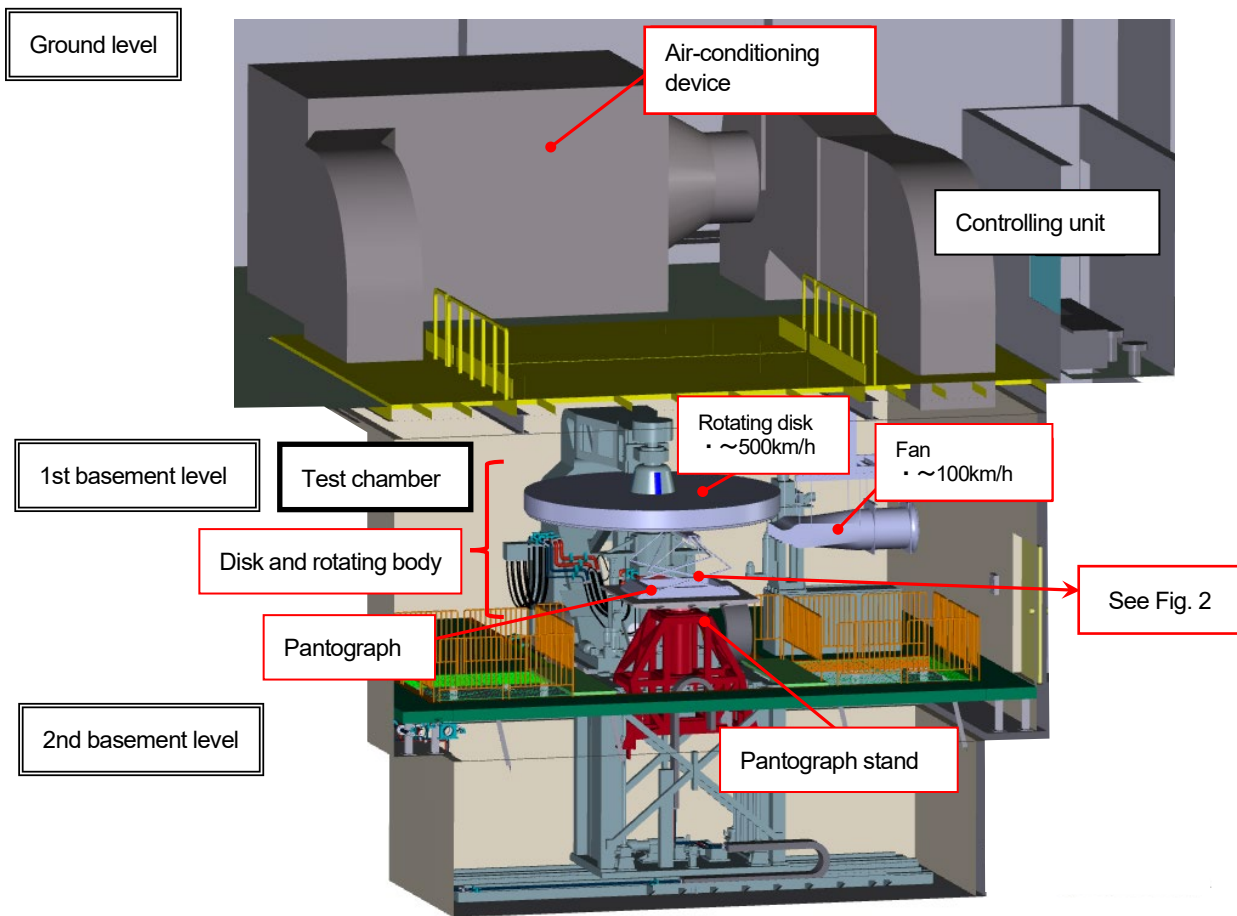


Fig.1: High-Speed Test Facility for Pantograph/OCL Systems

**Table 1: Specifications**

device		specification
Rotating disk	Maximum rotating speed	500km/h
	Vertical disk shaking	Maximum frequency: 27.8Hz Displacement: -100mm to +100mm (depending on frequency) Waveforms can be adjusted
	Lateral disk shaking	Maximum frequency : 5Hz Displacement: -300mm to +300mm (depending on frequency) Waveforms can be adjusted
Pantograph stand	Vertical shaking	Maximum frequency: 10Hz Displacement: -35mm to +35mm (depending on frequency) Waveforms can be adjusted
	Elevating distance	1600mm
Air-conditioning device	Temperature	-20°C to +40°C (When rotating disk is operated)
	Humidity	10%~90% (Humidity can be changed at the temperature of 10°C or higher)
	Fan	60 to 100km/h
Power unit	Type	AC or DC
	Voltage	100~600V
	Current	100~1000A (Controllable on 1 to 10 scale)



Fig.2: Testing on the high-speed test facility for pantograph/OCL systems  
(Rotating speed: 360 km/h, AC200V, 600A)

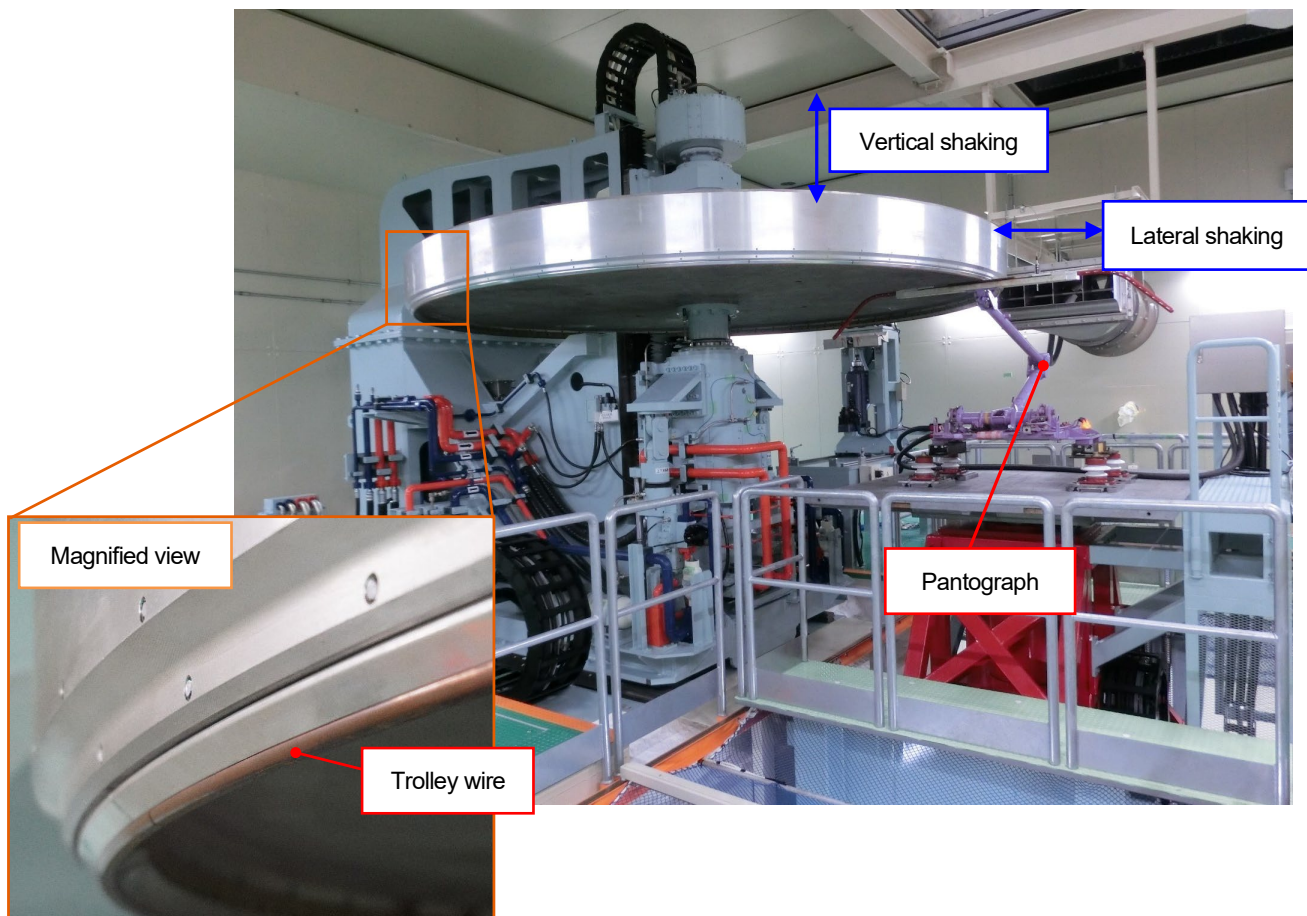


Fig.3: Rotating body and disk

## [Further tests and development]

### Evaluation of pantograph performance

We will evaluate the pantograph performance such as contact-keeping performance and rate of contact loss.

### Development of Shinkansen pantographs

We will efficiently develop pantographs for Shinkansen such as active-controlled pantographs.

### Development of sliding plates

We will improve the reliability of tests by properly controlling testing conditions including temperatures and humidities. Under the controlled conditions, we will analyze the mechanism of abrasion of trolley wire and pantograph sliding plates and improve the efficiency in the performance evaluation of sliding plates performance and materials evaluation to extend their service life.

## **Analyzing causes of failure**

By reproducing power supply conditions as well as vertical displacement of trolley wire, we will analyze failure causes and develop preventive measures efficiently.

## **[Reference]**

The performance of a conventional rolling disk machine used before is as follows:

- Maximum rotating speed: 300 km/h
- Power unit: 100V, maximum current 400A
- No air-conditioning device