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You must have enjoyed the tour in the premises of Railway Technical Research Institute, which is conducted by the editor. Let me take you to another spot, in which you would have interest, if you are a worker on train operation. But, I know, all the visitors to the tour can be attracted to the scene of the site. This is because visual information basically ensures easy understanding.

TRAIN OPERATION SIMULATOR

Outline. This simulator, which is used for the following researches, exactly imitates an actual driving console as well as wayside scenes and incorporates all the basic elements of train operation, in order to reproduce train operation close to that under actual conditions in a laboratory.

-Investigation of the processes to cause human errors, dozes, and fatigue of drivers while in train operation.

-Evaluation of the train operation performance of the aged and female drivers.

-Evaluation of work loads under different operating conditions such as train types and speeds.

Feature. This simulator:

-Enables the setting of error-inducing factors depending on the test purpose (aspects of departure and block signals, door opening/closing time, emergency brake release time).

-Allows the simultaneous recording of the information on train operation including signal types, signal aspects and gradients, subject's operation, powering and braking, and movement of visual axis, brain waves and other somatological information.

-Has a navigation function (with voice and images) to inform the driver of the timing to acknowledge signals and perform braking operation, in order to expedite the acquisition of the skill in train operation.

Table 1. Major Dimensions

-Driving cab	
Size	3.0 m (depth) × 5.0 m (width) × 3.0 m (height)
Screen	Type 90 flat screen
Monitoring camera	3 sets
-Route	
Section	Up- and down-tracks for 16.7 km (10 stations)
Operation time zone	Daytime, twilight, nighttime
Weather	Clear, cloudy, fog
ATC system	Speed check type
-Vehicle	
Load factor	0, 100, 200%
Acceleration	4 stages (average 2.7 km h^{-1} s^{-1})
Deceleration	8 stages (maximum 4.0 km h^{-1} s^{-1} for service, 4.7 km h^{-1} s^{-1} in emergency)

Remarks. This simulator was completed in fiscal 2001 with a subsidy by the Ministry of Land, Infrastructure and Transport, Japan.

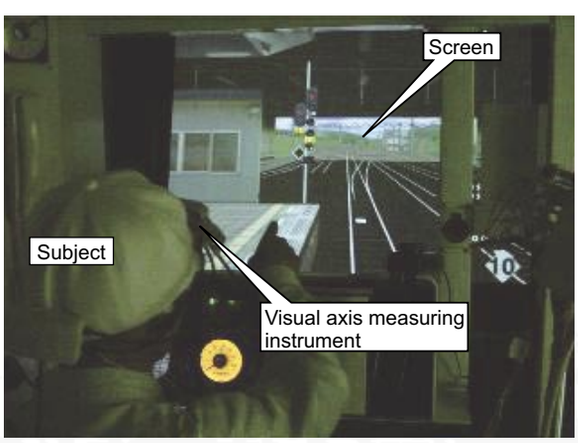

Figure 1. Scene of the driving cab in test.

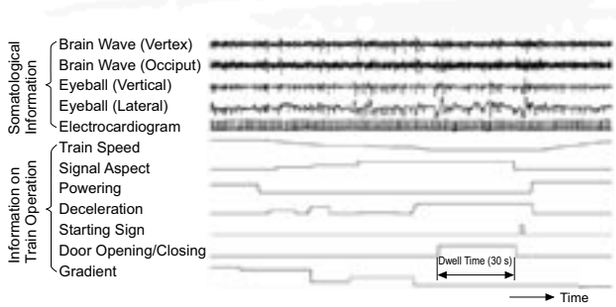

Figure 3. Example of the simultaneous recording of somatological and operating information.

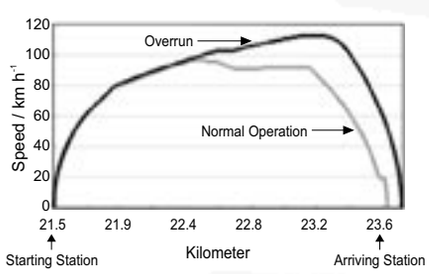

Figure 2. Example of train performance curve between two stations.

Figure 4. Distribution of the visual axis dwell time during operation on a straight section. Larger circles mean that the visual axis dwells at the position for longer periods of time.

Well, at this moment, I will recommend that you proceed two more spots, if you can take time. Here are working sites for study on civil engineering as well as rolling stock engineering. The former must be the civil engineering site where you are going to be for the first time. Stay here for a while and find them interesting.

TWO-AXIS ALTERNATE LOADING TEST MACHINE

Outline. This machine is used to implement static alternate (repeated) loading tests of reinforced concrete columns, steel columns, and other structural members.

Features. This machine is equipped with two abutment test walls monolithic with a test bed to simultaneously apply horizontal and axial loads to the specimen to perform widely-ranged tests.

Remarks. This machine has two abutment test walls that are perpendicular to each other. RTRI is now discussing how to make the best use of its special features.

Table 1. Major Dimensions

-Loading device	
Main hydraulic jack	Maximum load, ± 2,000 kN; Maximum displacement, ± 250 mm
Auxiliary hydraulic jack	Maximum load, ± 2,000 kN; Maximum displacement, ± 200 mm
-Reaction equipment	
PC abutment test wall (2 sets)	6.7 (9.0) m (width) × 6.5 m (height) × 2.0 m (thickness)
PC test bed	8.7 m (width) × 11.0 m (height) × 2.0 m (thickness)
Steel reaction frame	4.0 m (width) × 2.5 m (height) × 5.5 m (thickness) (Maximum span between column and beam centers)

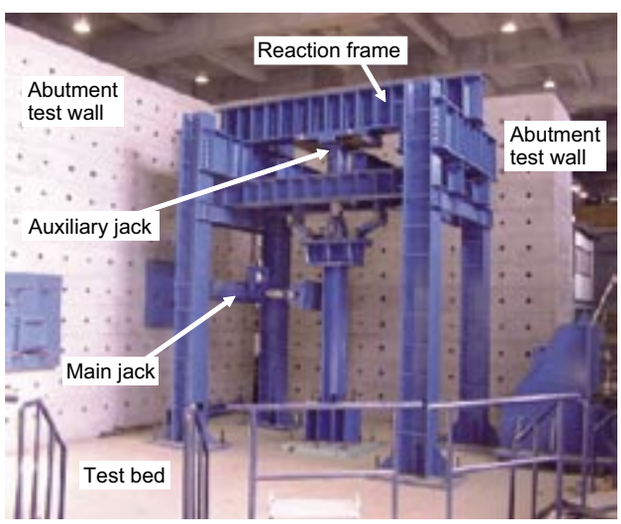

Figure 1. General view and test scene of a steel structural member.

Figure 2. Test scene of a concrete member.

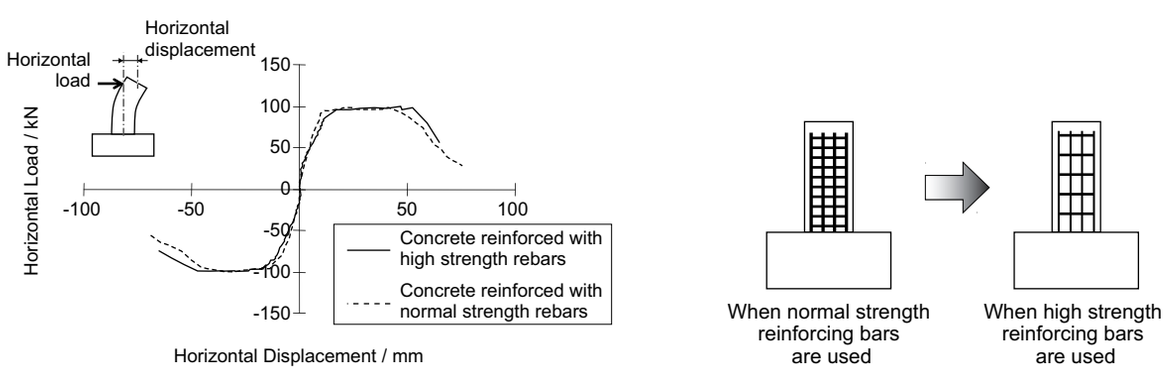

Figure 3. Comparison of the dynamic performance of concrete members reinforced with high and normal strength rebars. To improve the economy and the precision of casting concrete for reinforced concrete structures, Railway Technical Research Institute (RTRI) has promoted researches on the concrete reinforced with high strength rebars and found that the volume of reinforcing bars can be reduced while maintaining the dynamic performance equal to that of the concrete reinforced with normal strength rebars.

BRAKE PERFORMANCE AND DISK BRAKE TESTING MACHINES

Outline. The brake performance and disk brake testing machines are used to evaluate the properties of friction materials under the same conditions including inertia and speed as those in actual train operation.

-Brake performance testing machine

The brake performance testing machine is composed of a disk brake test unit, a tread brake test unit, and an adhesion test unit, each equipped with a sprinkler and a snowfall simulator.

-Disk brake testing machine

The disk brake testing machine is composed of a low-speed test unit and a high-speed test unit.

Features.

-Brake performance testing machine

The brake performance testing machine is used to test locomotives, EMUs for commuter transport and Shinkansen cars under widely-ranged test conditions, by controlling the brake shoe pressing force, deceleration, and torque in order to investigate the adhesion characteristics of disks, friction materials, rails and wheels, and is also used to perform the above test with hot water sprinkled on the track or at artificial snowfall simulated with liquid nitrogen.

-Disk brake testing machine

The disk brake testing machine is used to test the brake system of high-speed Shinkansen cars, for the stopping brake in emergency and service brake patterns or repeated at certain time intervals, and the holding brake on simulated down-gradients. The speed of the high-speed test unit is set at 2.5 times that of the low-speed test unit to test high-speed sliding materials and new disk brake systems used at higher speed than that of the conventional disk brake system.

Table 1. Major Dimensions

-Brake performance testing machine	
Maximum test speed	500 km h^{-1} (converted to the speed of ϕ860-mm wheel)
	580 km h^{-1} (adhesion test unit)
Maximum rotating speed	3,100 rpm
Diameter of test disk	ϕ350 to ϕ780-mm
Diameter of test wheel	ϕ700 to ϕ1,120-mm
Output of DC motor	350 kw
Temperature of sprinkled water	2 to 25°C
-Disk brake testing machine	
Maximum test speed	486 km h^{-1} (converted to the speed of ϕ860-mm wheel)
Maximum rotating speed	3,000 rpm (low-speed test unit)
	7,500 rpm (high-speed test unit)
Maximum diameter of test disk	ϕ780-mm (low-speed test unit)
	ϕ500-mm (high-speed test unit)
Output of DC motor	132 kW

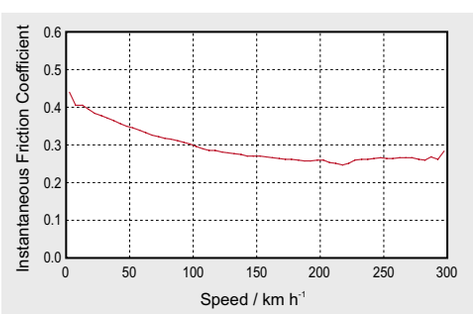

Figure 1. Friction coefficient of disk brake when the emergency brake is applied at 300 km h^{-1}.

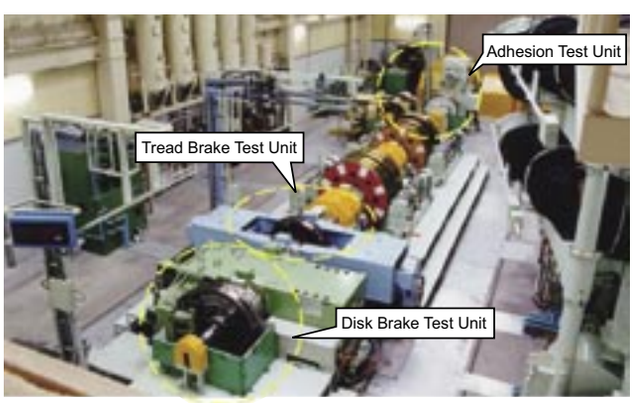

Figure 2. Brake performance testing machine.

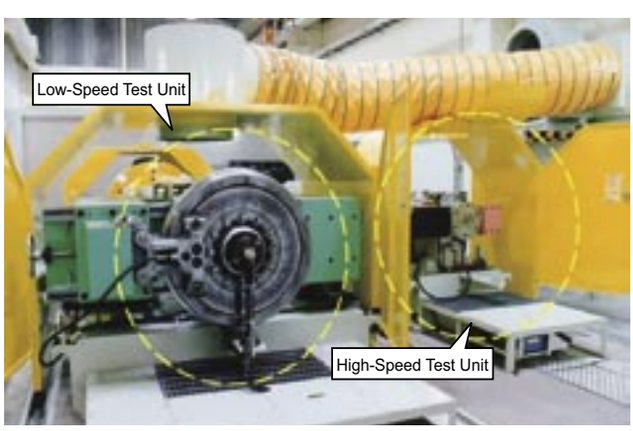

Figure 3. Disk brake testing machine.

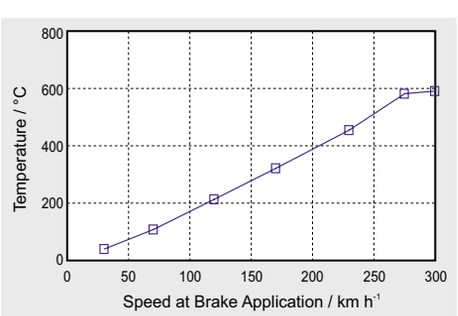

Figure 4. Maximum temperature of brake disk.