

RAILWAY VEHICLE WHEEL DEVELOPMENT AND QUALITY CONTROL

Testing Degree of Wear on Wheel Bearings and Rails

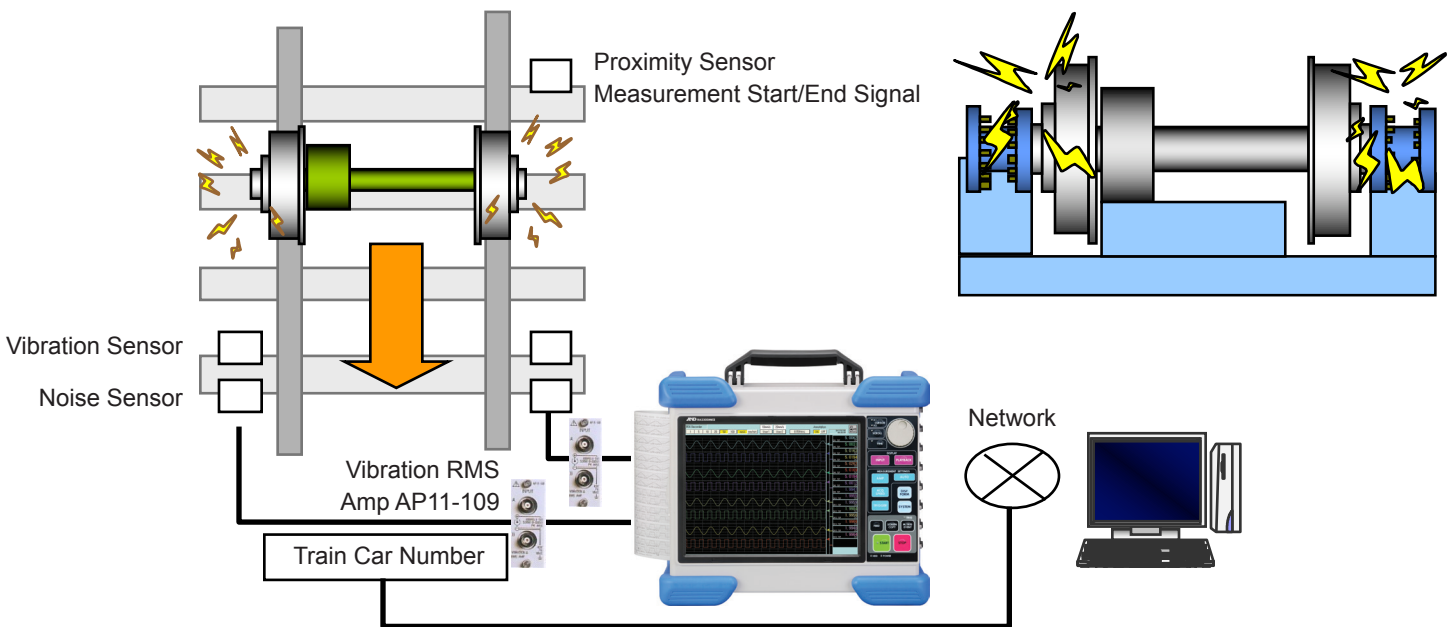
Measuring vibration and noise proves helpful for maintenance of bearings and wheel flanges in railway vehicles

Repeated braking of railway vehicles causes wear leading to vibration and noise, both sources of reduced ride quality. Noise and vibration from wheel bearings during forward and reverse motion is measured and put into a database to determine the normal range of noise and vibration.

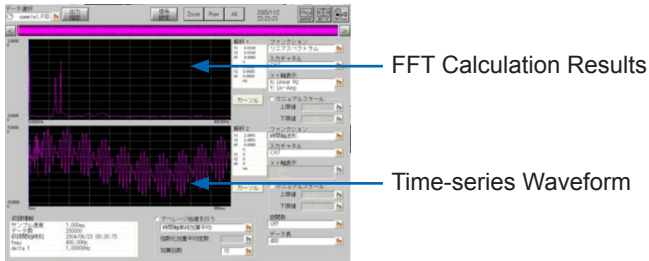
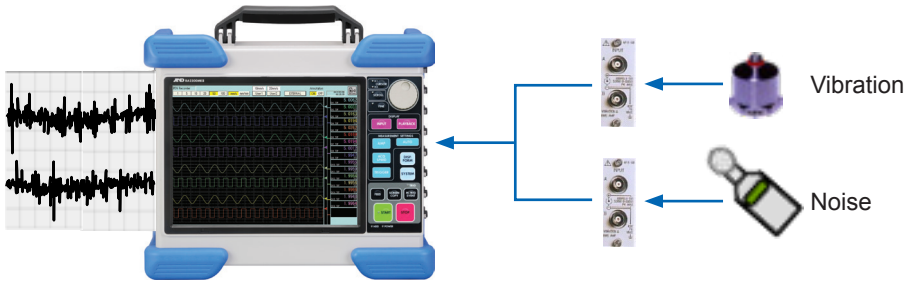
By comparing the measured values of noise and vibration with the database, the degree of wear of the wheel can be estimated.

RA2000A series digital oscillographic recorders connect directly to piezoelectric acceleration sensors, sound level meters or microphones and automatically print and record data as needed.

Rail-wheel Contact, Vibration and Noise Measurement System



RA2000A Series Omniace III Digital Oscilloscope Recorder



Item	Model	Specifications
2CH High Resolution Amp	AP11-101	$\pm 100\text{mV} \sim \pm 500\text{V}$, A/D res 16bit 10 μs
2CH High Speed Amp	AP11-103	$\pm 100\text{mV} \sim \pm 500\text{V}$, A/D res 12bit 1 μs
Event Amp	AP11-105	Input: 8 logic (Voltage/Contact)
2CH TC-DC Amp	AP11-106A	Input: R • T • J • K • W ($\pm 100\text{mV} \sim \pm 50\text{V}$)
2CH AC Strain Amp	AP11-104A	Response Frequency: 2KHz
2CH DC Strain Amp	AP11-110	Response Frequency: 50KHz
2CH Vibration/RMS Amp	AP11-109	$\pm 100\text{mV} \sim \pm 500\text{V}$
F/V Converter	AP11-108	Input: 1KHz \sim 10KHz

The Current State of Frictional Force Adjustment

Conventional trains can run at about 60 mph on straight track and track that curves at a radius of 200m or less. Sections connected to sharply curved track require speeds less than 25 mph. The frictional force between the wheel and rail is the largest external force affecting movement characteristics of a railway vehicle. On straight track a large frictional force is required for the driving force and braking force. However, when the frictional force becomes too great it can be a source of wheel flange and rail wear as well as noise on curved tracks. The friction coefficient can have large fluctuations over the day due to temperature and humidity. Maintaining an appropriate friction coefficient is important for track and train maintenance.

Did You Know?

The RA Series (RA2300MKII pictured upper left) simultaneously measures voltage, current, control timing, vibration, rotation, pressure and more directly from sensors. Recorded data can be converted to .csv data or used with FFT analysis software.