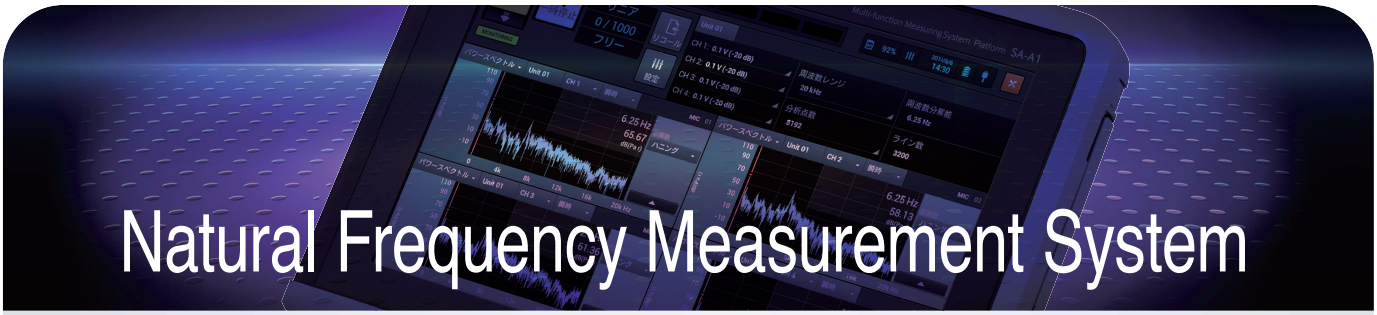
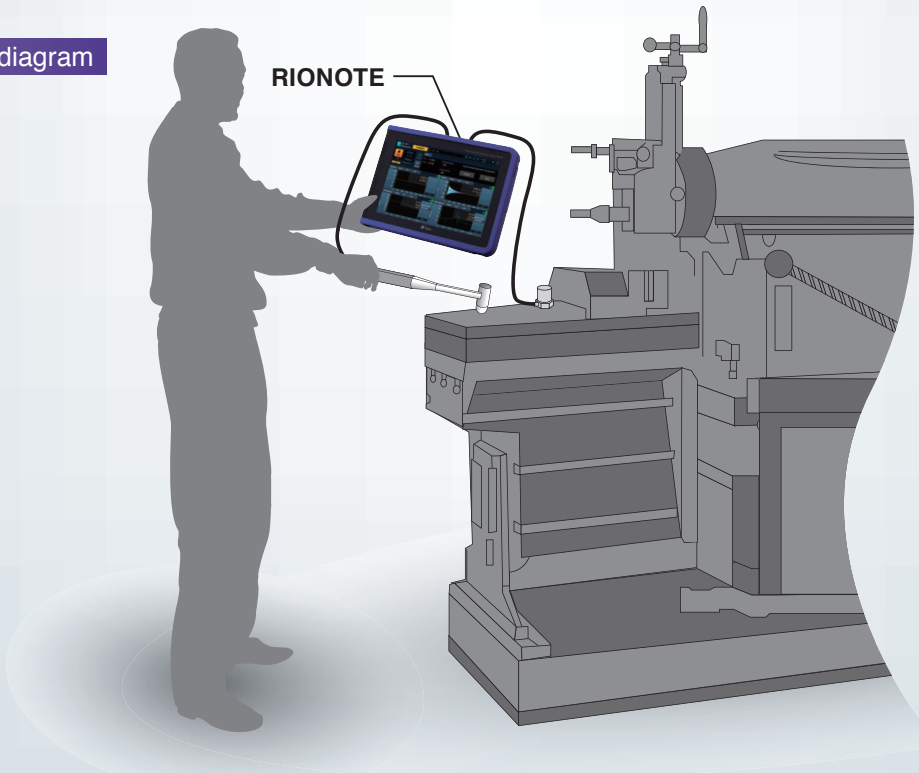


Natural Frequency Measurement System

This system is designed for in-depth observation of vibration phenomena in an object. The transfer function for the exciter signal and response signal is calculated and used to determine the natural frequency of the object. Natural frequency measurements are used in various fields for purposes such as analyzing the resonance and self-excited oscillation of structural objects, assessing the critical speed of rotational machinery, determining the Young's modulus and stiffness of objects, etc.
One method being used is attaching a piezoelectric accelerometer to the target object and hitting the object with an impulse hammer. The transfer function is then calculated from the two time waveforms. Another approach that serves for assessing the modulus of elasticity of wood is hitting the wood in the axial direction with an impulse hammer and using a piezoelectric accelerometer attached to the opposite side to measure the acceleration. The transfer function is calculated from the two waveforms and the natural frequency is determined.
The system shown here uses the RIONOTE Multifunction Measurement System with the FFT analysis program SX-A1FT to easily determine the transfer function between channels averaged for the number of measurements. The impulse hammer and piezoelectric accelerometer can be connected directly if equipped with an integrated amplifier. The trigger function allows selective waveform data acquisition when the object is hit.

System diagram



Equipment configuration

Product	Model	Quantity
Portable Multi-function Measuring System (2 channel/4 channel FFT package)	SA-A1FTB2/SA-A1FTB4	1
Piezoelectric accelerometer (with integrated amplifier)	PV-91C/97I	1
Accelerometer cable	VP-51 series	1
BNC adapter	VP-52C	1
Impulse hammer with integrated amplifier	e.x. Dytran 58 series	1
Impulse hammer cable		1

Measurement result examples

Application examples

- Measuring the natural frequency measurement of structural objects
- Measuring the natural frequency of rotary shafts in machinery
- Measuring the natural frequency of materials
- Determining the strength (Young's modulus) of wooden material
- Assessing the stiffness of bridge piers

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