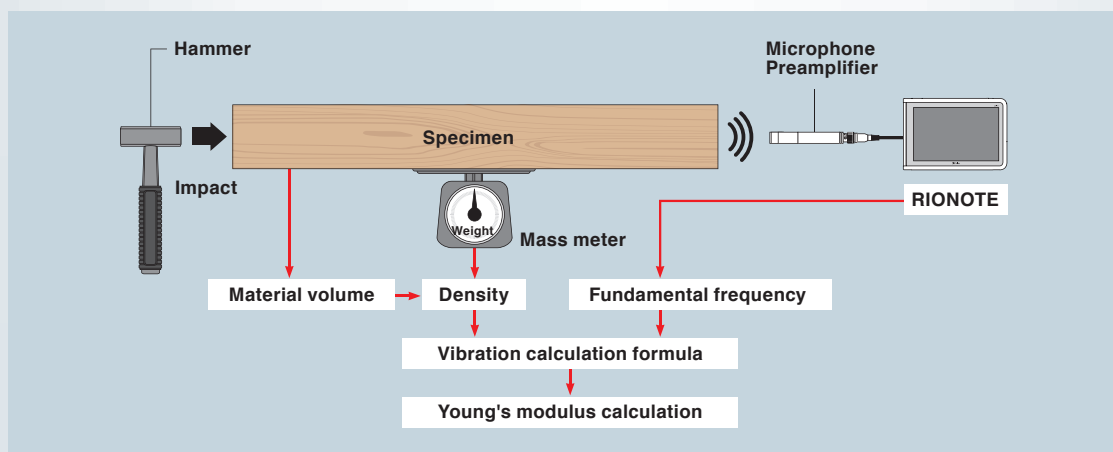


Young's Modulus Measurement System for Wood

Using this system, a piece of wood under test is hit with a hammer, and the resulting sound is measured with the RIONOTE Multifunction Measurement System. Young's modulus is then determined from the sound frequency and the material volume and density of the wood. The Preamplifier NH-22 and Microphone UC-59 can be directly connected to the RIONOTE, whose light weight (only about 1.2 kg), small dimensions, and battery driven operation make it eminently portable, for easy measurement and analysis in the field.

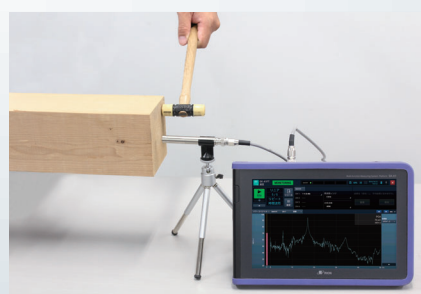
System Diagram



Vibration calculation formula

$$E_f = (2Lf_0)^2 \rho \text{ (Pa)}$$

E_f : Young's modulus (Pa) M : Mass (kg)
 L : Length (m) f_0 : Fundamental frequency (Hz)
 W : Width (m) ρ : Density (kg/m³)
 D : Thickness (m) $\rho = \frac{M}{W \times D \times L}$



Equipment configuration

Product	Model
Multi-function Measuring System (2 channel/4 channel FFT package)	SA-A1FTB2/SA-A1FTB4
SD card (512 MB/2 GB/32 GB)	MC-51SD1/20SD2/32SP3
1/2 inch electret condenser microphone	UC-59
Preamplifier	NH-22A
BNC-BNC coaxial cable	EC-90 series
Small tripod	
Mass meter	
Hammer	

Measurement result examples



Screen example for FFT analysis of impact sound

Screen example for Young's modulus calculation software (freeware)

Using a computer, entering the fundamental frequency as determined by FFT analysis along with the specimen's dimensions and mass allows calculation of Young's modulus.

Application examples

- Young's modulus measurement for various types of wooden material



JCSS
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