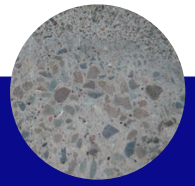
Sonelastic®

ATCP Physical Engineering

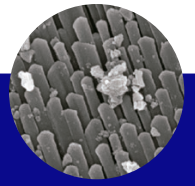
The accurate and non-destructive solution for elastic moduli and damping measurement.

In accordance with E1876, E756, C1548 and C1259 ASTM standards

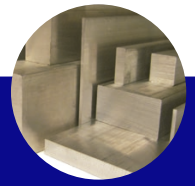
Ceramics and refractories



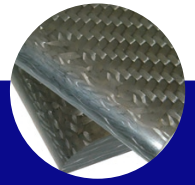
Concrete and cementitious



Polymers and biomaterials



Metals and alloys

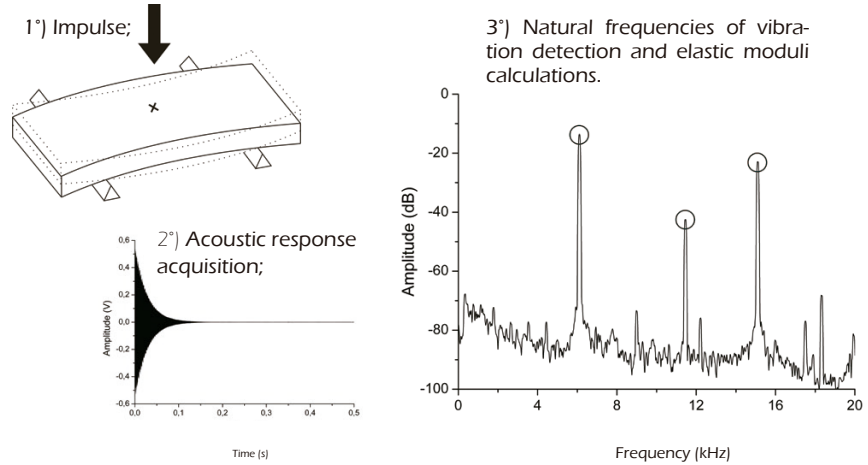


Composites and woods

Sonelastic® is a set of configurable solution for the non-destructive characterization of damping and elastic moduli (Young's modulus, shear modulus, and Poisson's ratio) employing the Impulse Excitation Technique.

The Impulse Excitation Technique

This technique is based on natural frequencies of vibration. When submitted to a light mechanic impact, the sample under test emits a characteristic sound according to its dimensions, mass and elastic properties. The frequencies and decay rate of the acoustic response allow an accurate determination of the elastic moduli and damping.



Applications and samples

Sonelastic® measures the elastic moduli of any rigid material in the shape of discs, rings, rectangular or cylindrical bars with dimensions ranging from 20 millimeters (3/4 inch) to 5.3 meters (17.4 feet).

Configurations

The typical configuration comprises a software, an acoustic sensor and a sample holder that will vary according to the sample's geometry and dimensions. Accessories, such as the automatic electromagnetic impulse device and instrumented furnaces, allow automatic measurements as a function of time and temperature.

Areas of application

Biomaterials, composites and technical ceramics

Sonelastic® measures elastic moduli of biomaterials, polymers, composites, metals and technical ceramics under a typical uncertainty lower than 1%. It is possible to characterize rings, discs, rectangular and cylindrical bars.

Sample holder for small samples and clamped bars

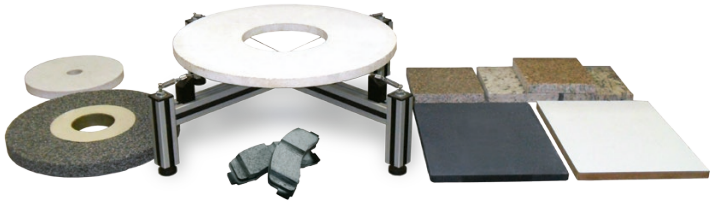
Structural and large-sized elements

Sonelastic® characterizes natural frequencies of vibration and damping to ensure the quality control of beams, panels, railway sleepers, pillars and poles.

Sample holder for extra-large elements

Grinding wheels, abrasive and friction materials

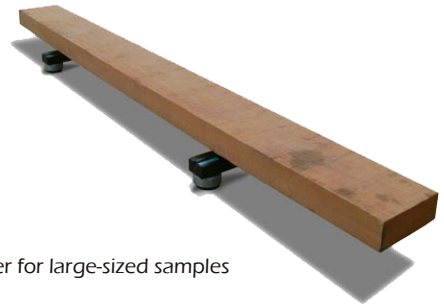
Sonelastic® tests grinding wheels, abrasive materials, brake pads and linings by detecting variations in materials' elastic moduli and damping.



Sample holder for plates and discs

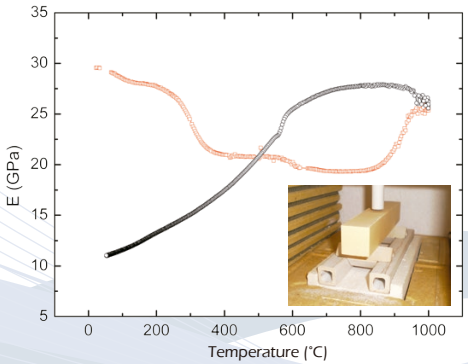
Woods and derived materials

Sonelastic® grades woods and derived materials. It also assists in obtaining longitudinal, transversal and radial elastic moduli. Trunks, beams, and lamellas may also be tested, as well as glue-laminated wood and plywood.



Sample holder for large-sized samples

Measurements as a function of time and temperature



Sonelastic® has accessories for automatic characterizations as a function of time and temperature, being applicable to studies involving drying, curing and sintering cycles.

Variation of Young's modulus during the firing of a refractory castable

Refractories, concretes and rocks

Sonelastic® is employed to evaluate the refractories esistance to thermal shock damage, to ensure concretes quality control, and to determine the sound speed in rocks.

Adjustable sample holder for bars and cylinders

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Equipment developed and manufactured by ATCP Physical Engineering.