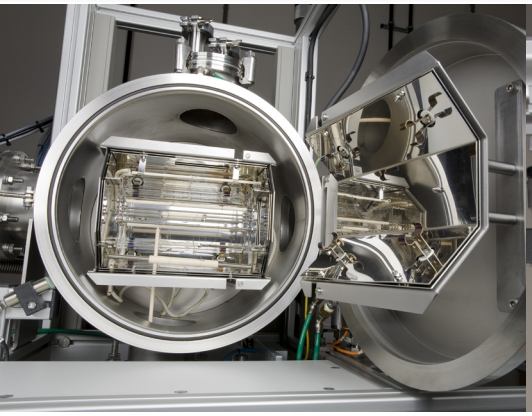
RFDA LTVP800

Specialized furnace for mechanical spectroscopy from -50 °C up to 800 °C in vacuum

The **LTVP800** furnace is designed to perform impulse excitation measurements between -50 °C and 800 °C in vacuum.

In order to determine the elastic properties and the damping as function of the temperature, measurements are performed in predefined intervals during heating and cooling (1-60 °C/min).



Benefits

- **Simultaneous Young's and shear modulus measurements**
- **Damping / internal friction measurements**
- **Temperature range: -50 °C - 800 °C**
- **Infrared heating for high heating rates**
- **Characterization under vacuum conditions**
- **Top hat furnace for easy sample loading**
- **Sample lengths up to 120 mm**
- **Laser vibrometer optional**

Specifications

Furnace unit

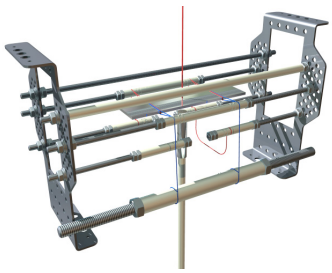
Internal dimensions	Diameter: 350 mm Height: 350 mm
Temperature range	-50 °C – 800 °C
Heating elements	Infrared heating
Sample cooling	Indirectly by liquid nitrogen
Insulation	Vacuum
Furnace cooling	Water cooling
Atmosphere	Vacuum
Sample loading	Front loading
Vacuum pressure	10^{-4} mbar
Vacuum pump	Turbomolecular vacuum pump
Laser vibrometer	Included

Sample cooling and sample support

The sample is indirectly cooled by placing a cooling block around the sample. Before starting cooling the sample, the furnace is purged with dry nitrogen gas to avoid condensation inside the furnace. The block is cooled by liquid nitrogen and the sample is brought to a temperature lower than -50 °C. Afterwards, the block is pulled out and the chamber is pumped to 10^{-4} mbar. Now, the infrared heating elements are used to control the heating cycle.

Max. sample dimensions:

Length	100 mm
Width	30 mm
Thickness	6 mm



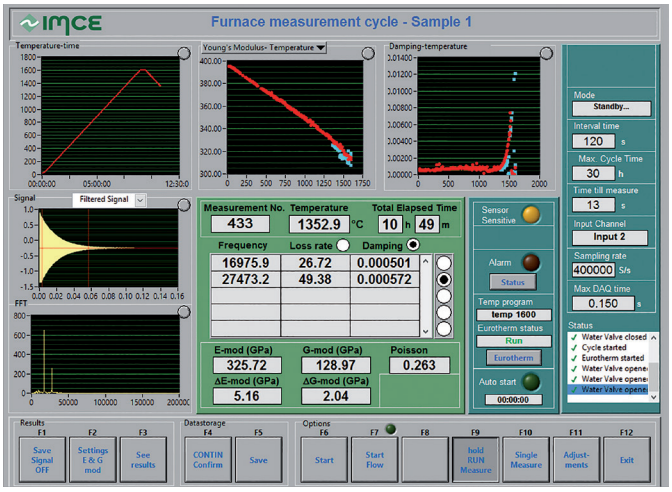
RFDA Professional system

The RFDA LTVP800 system consists of the RFDA Professional system extended with the LTVP800 furnace.

Contact us for more information about the RFDA Professional system or visit our website **www.imce.net**.

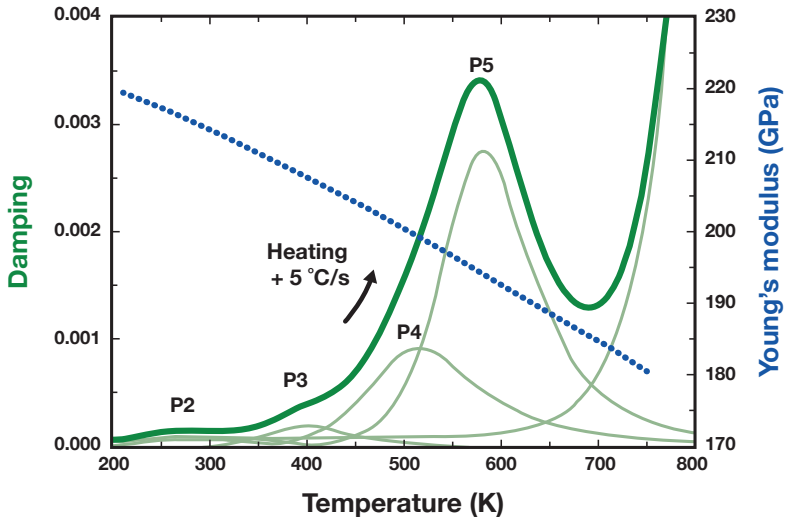
RFDA LTVP800 software

- Analysis software to determine the Young's modulus, shear modulus, Poisson's ratio, internal friction and resonant frequency.
- Setting up a heating cycle for the furnace and an IET measurement cycle.



Measurement example

The use of ultra-high strength press hardened steel (PHS) parts has substantially increased in automotive application in order to increase passenger safety and vehicle fuel efficiency. Information about the C atoms distributions and interactions with dislocations is crucial. The internal friction spectrum and the temperature dependence of Young's modulus of die-quenched 22MnB5 PHS is shown. The internal friction technique gives characteristic peaks due to interstitial-dislocation interactions. Four distinct Debye peaks, related to specific dislocation processes, can be observed with their specific activation energies and relaxation times.



Choi, W. S. et al. (2015). Internal-friction analysis of dislocation–interstitial carbon interactions in press-hardened 22MnB5 steel. Materials Science and Engineering: A, 639, 439-447.

IMCE nv
Slingerweg 52 - Poort Genk 5489, 3600 Genk - Belgium
P: +32 (0)89 41 00 70 | F: +32 (0)89 41 00 79 | info@imce.net
www.imce.net