



**POLITECNICO**  
MILANO 1863

DIPARTIMENTO DI MECCANICA

# Measuring devices and calibration

## Experimental characterization of mechanical and civil structures with innovative techniques

### Description:

The laboratory facilities (more than 1200 sensors, calibration and loading devices) allow performing static and dynamic tests on elements with scales ranging from millimeters to hundreds of meters, as well as acoustic tests on components and assemblies. Vision-based measuring devices allow the 3D motion estimation and the reconstruction of shape and strain conditions. Fit for purpose measurement systems can be developed according to the customers' requests.

### Accredited Staff:

NDT qualification complying with EN 473, ISO 9712 and SNT-TC-1° in testing by electrical resistance strain gauges (Level 1 and Level 2).  
NDT qualification complying with UNI EN ISO 9712:2012 (RINA RC/C.14 directive) – method Acoustics and Vibration (Level 3).

### Certifications:

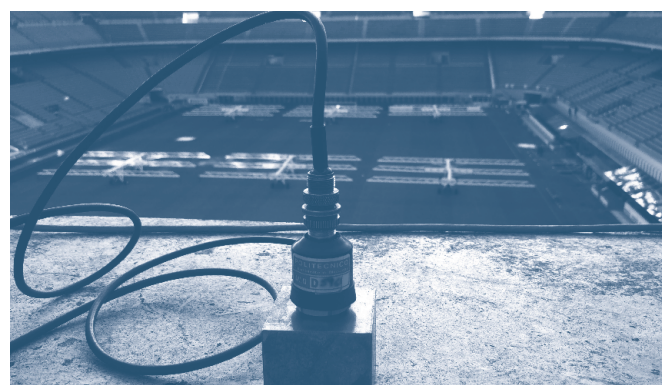
Accredited laboratory for acceleration transducer calibration: Settore Accelerometria of Politecnico di Milano, Laboratorio Accreditato di Taratura LAT 104.

### References:

ABB, AgustaWestland, Comune di Milano, Veneranda Fabbrica del Duomo di Milano, Leonardo SpA, ASI (Agenzia Spaziale Italiana), ESA (European Space Agency), STMicroelectronics.

### Instruments & Facilities:

- Electrodynamic shakers - max force 25 kN @ 3.5 kHz.
- Several tens of sensors for mechanical and thermal measurements, especially vibrations and NVH
- Different data acquisition systems
- 3D Digital Image Correlation (DIC) systems for 3D strain field re-



construction.

- 3D vision-based scanners with customized working volume.
- Infrared imaging for contactless thermal field measurements and non-destructive defect detection.
- Scanning Laser-Doppler vibrometer for non-contact vibration measurement and modal analysis of mechanical systems.
- Industrial cameras and lenses for vision-based measurements
- Hyperspectral Imaging System
- Thermo-vacuum chamber for characterization of components between -180 and 200°C.
- Instrumentation for mechanical, thermal and acoustic measurements.

**Activities:**

Large/small structure dynamic testing and monitoring

Structural Health Monitoring of bridges, stadia, high rise buildings railway, tie-rods and cultural heritage  
Experimental and Operational Modal analyses.  
Long-term continuous structures monitoring.  
New sensing systems for civil and industrial engineering  
Human-structure interaction

Artistic and historical landmarks monitoring and protection

Historical and artistic structures monitoring.  
Statue vibration and seismic isolation.  
Long-term continuous monitoring.

Vibration control and monitoring with smart materials

Vibration mitigation through smart approaches (e.g. piezoelectric shunt, shape memory alloys)  
Structural monitoring through smart materials  
Acoustic testing and analyses  
Noise source identification through microphone arrays  
Sound quality, synthesis and Psycho-acoustic analyses  
Vibro-acoustic correlations and path analyses (e.g. TPA, component-based TPA, substructuring)

Vision-based measuring systems

3D measurements with drone-carried vision devices.  
Contactless measurement of strain field for mechanical analysis.  
Failure analysis of civil structures and concrete beams.  
Remote monitoring of bridges vibration by means of vision devices.  
Dynamic measurement of structures vibration, including harsh environment measurements like helicopter blades tracking during operation.

Measurements for space

Development of FTIR spectrometers for remote sensing.  
Development of opto-mechanical systems for space application.  
Characterization of mechanical systems in cryogenic conditions.  
Qualification of components for space applications.

