

Acoustics and vibration tests

Vibration

- Vibration tests with sine, random and time history signals in uniaxial or multi-axis equipment combined with climatic chambers
- Shock tests up to 100 g
- Possibility of reproducing time signals (vibration durability and squeak & rattle profiles under road conditions applying time signals acquired directly on vehicle)
- Modal analysis of components and complex structures
- Calculation of Operating Deflection Shapes on structures submitted to vibration
- Analysis and detection of squeak & rattle under uniaxial and multiaxial road vibration conditions
- Electrical characterisation tests on components under combined vibration and climatic conditions
- Fatigue analysis and mechanical durability tests on components submitted to vibration
- Vibration transmission and vibration comfort tests on vehicle seats

Acoustics

- Measurement of operating noise and squeak & rattle produced by vibrations in acoustic chamber
- Sound pressure level and acoustic intensity measurement
- Acoustic mapping and sound power evaluation
- Acoustic characterisation of materials (sound absorption and transmission) using impedance tube
- Acquisition of on-road sound pressure and acceleration time signals
- Vibration tests combined with temperature for vibroacoustic and structural analysis of components
- Signal analysis (FFT, CPB and order analysis)
- Implementation of customized vibration and acoustic measurement and processing solutions

Equipment

Multi-axis electro-hydraulic shaker combined with climatic chamber and acoustic chamber

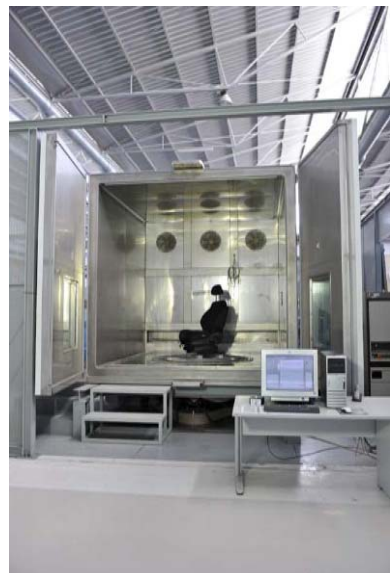
- 6 degrees of freedom
- Maximum load: 500 kg
- Displacement
 - ± 37 mm (vertical)
 - ± 37 mm (longitudinal)
 - ± 37 mm (transversal)
- Maximum frequency: 500 Hz
- Simultaneous vibrations on the 6 DOF at room temperature or in climatic chamber

36.5 kN electro-dynamic shaker with combined sliding table

- Vibration in two directions (vertical and horizontal) combined with specific temperature and humidity conditions
- Maximum load: 600 kg
- Maximum acceleration: 110 g
- Displacement: ± 25.4 mm
- Maximum frequency: 2000 Hz
- Vibration profiles: sine, random, sine on random, shock, time signals

22.2 kN portable uniaxial electro-dynamic shaker

- Tests in acoustic chamber, climatic chamber or independently
- Maximum load: 350 kg
- Maximum acceleration: 60 g
- Displacement: ± 25.4 mm
- Maximum frequency: 3000 Hz
- Vibration profiles: sine, random, sine on random, shock, time signals
- Low noise system suitable for squeak & rattle tests



Acoustics equipment

- Semi-anechoic chamber with reduced noise level to measure noise in components or squeak & rattle caused by vibration
- Brüel & Kjaer data acquisition and processing systems
- Portable data acquisition equipment for in-vehicle measurement. Possibility of custom configuration for data-acquisition / on-board processing of data
- Impedance tube for acoustic transmission and absorption tests. Modal exciter for the analysis of natural vibration modes
- Instrumented hammer for modal analysis
- Probe for sound intensity measurement
- Accelerometers and microphones for system monitoring
- Specific software for acoustic and modal analysis to create acoustic maps, locate noise sources and sound signal analysis
- Equipment for modal analysis of complex structures such as complete body-in-white



Internal R&D projects

- **RUIDOS I and II:** Analysis and prediction of noise sources in automobiles. Studies on individual components and determination of their contribution in complete vehicle. Projects financed by the directorate general of SME policy-General Secretariat of Industry, Tourism and Trade, in 2005 and 2006.

Linked areas

- CAE: test results correlation for the optimisation of natural frequencies and modal analysis calculation
- CAD design and simulation of specific frames for vibration tests
- Electricity, automation and instrumentation

