TEST OF MECHANICAL COMPONENTS LABORATORY

Static and dynamic tests on real components or structures

The laboratory is equipped with multirange servohydraulic actuators and other facilities to perform tests on fullscale components and structures. The equipment includes servocontrollers, load cells, electrodynamic shakers, modular constraint systems, various transducers (pressure, temperature, displacement, acceleration, strain, acoustic waves, etc.), with dedicated signal conditioners and acquiring systems. A novel microcompression device, compatible with a synchrotron, is available for multiscale mechanical testing. The laboratory is supported by modelling capabilities (mainly numerical FE and CFD models) in order to replicate and extend experimental activities by means of "virtual tests" (predictive models).

INSTRUMENTS & FACILITIES

SPECIAL SET-UPS FOR FULL-SCALE COMPONENT TESTING Servo-hydraulic actuators (max force 1000 kN)

Electrodynamic shakers (max force 25 kN)

Controllers for servo-hydraulic actuators: single and multichannel (MTS 407, MTS Flex Test Ilm, MTS Aero GT, MTS Flex Test SE, etc.)

Constraint systems with treaded holes or grooves and steel beams to build customized frames for full-scale tests

OTHER EQUIPMENT AND DEVICES

Load cells

Displacement transducers

Rotation transducers

Pressure and temperature transducers.

Accelerometers

Systems for data analysis

Systems for strain measurements

Optical fiber interrogator with Military Standard environmental qualification (MIL-STD 810G).

Multi-channel oscilloscopes

Micro compression device suitable for small samples' testing and compatible with synchrotron facility

ACTIVITIES

SINGLE AND
MULTI-ACTUATOR
TESTS ON
MECHANICAL
COMPONENTS AND
LARGE-SCALE
STRUCTURES

Fatigue tests to define the life of a component

Application of a load spectrum to simulate a real stress condition

Static and dynamic tests to verify the integrity of components and large-scale structures subjected to the real operating conditions

Detection and monitoring of crack propagation during a fatigue test (non-destructive methods, microscope, crack gauges, etc.)

Determination of the influence of several technological parameters on the fatigue resistance

Laboratory testing of structural health and usage monitoring systems under varying load and environmental conditions

On-platform testing

FATIGUE TESTS
FOR BIOMEDICAL
APPLICATIONS
AND MULTI-SCALE
MECHANICAL
CHARACTERIZATION
OF BIOLOGICAL
TISSUES

Static and fatigue tests to verify the resistance of limb prosthesis

Performance optimization of leg prosthesis for sportive applications

Static tests performed outside and inside a synchrotron to determine meso and micro characteristics of biological tissues

Detection of microdamage mechanisms

GEAR FATIGUE TESTS

Tooth Bending Fatigue, Contact Fatigue (pitting and micropitting), vibration and noise, efficiency, contact pattern and torsional stiffness tests on gears and gear reducers.

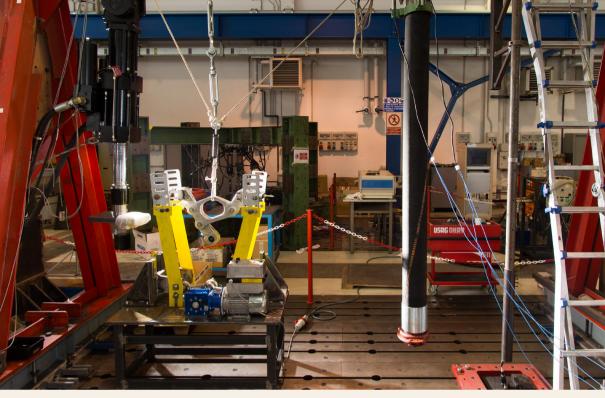
Several experimental devices are available:

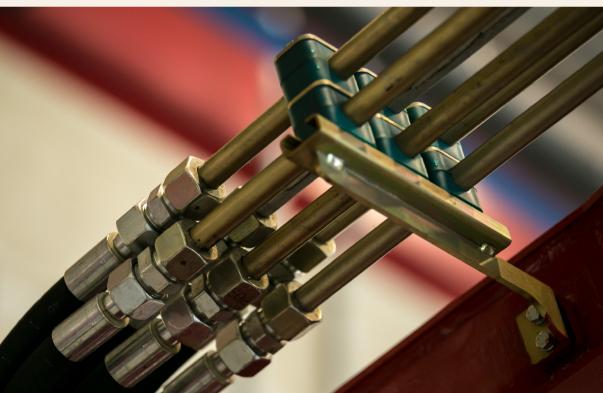
CENIT 2, a power-recirculating test rig suitable for gear contact fatigue (i.e. pitting), scuffing and bending fatigue tests on running gears Schenck mechanical resonance pulsator for tooth root bending fatigue tests with a STBF (Single Tooth Bending Fatigue) approach. VIBRU, Motor / brake test rig up to 100 kW, reconfigurable on plates, for measurements of Transmission Error and Noise Electric power recirculation test rig, DC motor and brake, 30 kW, 3,000 rpm reconfigurable on plates.

DYNAMICAL CHARACTERIZATION OF COMPONENTS

Tests to analyze the dynamical behavior (frequency response, mechanical impedance, fatigue resistance, etc.) of components and systems using electromechanical shakers

Development of control systems for vibrations on "Smart structures"





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