



**POLITECNICO**  
MILANO 1863

DIPARTIMENTO DI MECCANICA

# Cable Dynamics Lab

Experimental tests for the evaluation of the dynamic properties of cables, dampers, spacers

## Description:

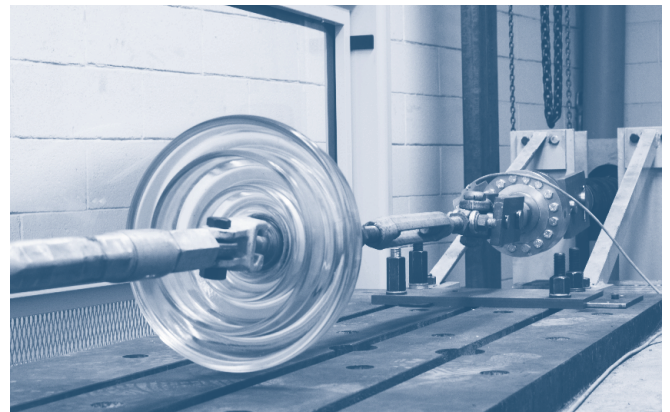
The knowledge of the cable and damping devices mechanical properties allows to correctly estimate, through numerical models, the overhead transmission line dynamic response to the wind excitation. In particular, conductor self-damping together with damper dynamic stiffness and spacer-damper stiffness and damping properties are evaluated through laboratory tests and are used in the numerical models both to assess the conductor + damping devices dynamic performance and to optimise the damping devices design. The laboratory allows both customized tests and standard tests carried out according to the main International Standards.

## Certifications:

- Test "Stockbridge Type Dampers Dynamic Characterisation" (ISO9001:2008 certification).
- Test "Stockbridge Type Dampers Effectiveness Test" (ISO9001:2008 certification).

## References:

Enel, Terna, EDF (France), NTDC (Pakistan), Statnett (Norway), ESB (Ireland), De Angeli Prodotti, TRATOS, LS Cables (Korea), Salvi/Dervaux (France), Damp/Mosdorfer (Austria), Cariboni/Alstom, Fratelli Bertolotti, Gorla Morsetterie, Arruti (Spain), SA-RA Energy (Turkey)



### Instruments & Facilities:

- 50m long laboratory span
- Programmable Logic Control (PLC)
- Gearing Watson electro-dynamical shaker + amplifier (V617/DSA4-8k).
- Unholtz&Dickie electro-dynamical shaker + amplifier (SA15-S452).
- B&K 1050 controller.
- Electromechanical actuator UNIMEC TP7010 MBD with electrical motor 7.5kW 750rpm (conductor tensile load control)
- N. 5 current suppliers TDK Lambda GEN25-400-3P400 (50kW total power)(conductor heating - thermal tests)
- Load cell U10M/250kN + HBM Scout 55 ( conductor tensile load measurement)
- Kistler 30 kN piezoelectric load cells.
- Piezo-accelerometers B&K 4508 with power amplifiers PCB 480E09.
- Strain gauges and conditioning modules.
- Laser transducers and other displacement transducers
- Temperature sensors
- Various sizes hydraulic actuators and load cells + MTS Flex Test Digital Controllers

### Activities:

Cable self-damping test

- Decay Method.
- Power Method.
- Inverse Standing Wave Ratio.

Cable + suspension clamp fatigue test

High temperature conductors thermal tests

- linear coefficient of thermal expansion
- Sag curve/knee-point temperature

Stockbridge dampers dynamic performances

- damper characteristic curve (Mechanical impedance/Dynamic stiffness with Imposed constant speed or constant displacement)
- damper effectiveness test

Spacer-dampers dynamic characterization

- Stiffness and damping properties
- Stiffness and damping properties at high and low temperature
- Aeolian vibrations and subspan oscillations fatigue tests
- Simulated short circuit test
- Slip test

