SMARTeR
Shape Memory Alloys to Regulate Transient Responses in civil engineering

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Project leader
Principal Laboratories and Investigators

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and an Associated Partner,
JRC, Georges Magonette.
Shape Memory Alloys have important dissipative properties which are all connected to the solid-solid phase transformation between austenite (stable at high temperature) and martensite (stable at low temperature):

- possibility of dissipating large amounts of energy;
- good fatigue resistance and great reliability in the long run.
SMA have the potential to be used in structural design as a smart material able to mitigate the effects of transient loading.

The proposed Project builds on these ideas: methodologies and tools for the optimal design of SMA dampers fitted for applications in civil engineering.
- **Task 1** Development of adequate constitutive laws and material models (12 months)
- **Task 2** Development of numerical tools for the simulation and control of structures incorporating SMAs (12 months)
- **Task 3** Small-scale experiments (15 months)
- **Task 4** Large-scale experiments & Finalization (18 months)
The aim of the large scale experiment is the validation of a SMA damper designed to reduce the vibrations due to wind in the cables of bridges.
The large-scale tests will be performed on an actual cable-stayed bridge in the west of France.
Bridge of Saint Nazaire
Task 1 Development of adequate constitutive laws and material models (12 months)

- state-of-the-art, thermomechanical and physical modelling, mathematical study of the evolution problem.

Milestone 1 Delivery of material models for SMA, consistent with physical, mechanical and mathematical considerations
Task 2  Development of numerical tools for the simulation and control of structures incorporating SMAs (12 months)
development of numerical algorithms, mathematical validation, control strategies

Milestone 2  Validation of the models by comparison between simulation and small-scale experiments

Deliverable: report on the models developed (constitutive laws, numerical algorithms, control)
Task 3 Small-scale experiments (15 months)

- Identification of the constitutive parameters entering the models considered, validation of the control strategies and simulation tools.

Milestone 3 Implementation of SMA-based control strategies on small-scale experiments.
Task 4  Large-scale experiments & Finalization (18 months)

- true-scale validation of the methodologies developed, conclusions on the design of SMA-dampers

Milestone 4  Validation of the methodologies developed on large-scale experiments

- Deliverable: rules and recommendations for the optimal design of SMA-based dissipators in civil engineering.
Location
The meeting will be held at IMATI (Institute of Applied Mathematics and Information Technology) - C.N.R. in Pavia.

Accommodation
Participants are advised to make their own hotel reservation. A list of hotels in Pavia is provided for convenience.

Hotel Aurora ★★★
27100 Pavia (PV) - Viale Vitt. Emanuele, 25
+39 0382 23664
info@albergoaurora.com
www.albergoaurora.com

Hotel Rosengarten ★★★★
27100 Pavia (PV) - Piazza Golgi, 21/23
+39 0382 326312
www.rosengarten.pv.it
rosengartenpv@tin.it

Excelsior Hotel ★★★★
27100 Pavia (PV) - Piazzale Stazione, 25
+39 0382 26596
www.hotelgrispavia.com/hotel_excelsior_pavia/ambienti.html
info@excelsiorpavia.com

Hotel Ariston ★★★ (restoration – opening sept’06)
27100 Pavia (PV) - Via Scopoli, 10
+39 0382 343234
ariston@aristonpavia.it
www.aristonpavia.it

Moderno Hotel Pavia ★★★★★
27100 Pavia (PV) - Viale Vittorio Emanuele, 41
+39 0382 303401
www.hotelmoderno.it
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Registration
Early registration is kindly recommended. Participants should communicate their participation and the title of their presentation by returning the registration form. A fee of approximately 120.00 € may apply. The fee comprises a fixed-menu lunch and social dinner plus coffee breaks.