

Green City Car

Integrated solutions for
noise & vibration control in vehicles



■ Motivation and Objectives

Pursuing the different concept in a holistic approach, Green City Car aims to demonstrate the feasibility of applying active systems to NVH-related problems of advanced powertrains from a system point-of-view. This holistic approach should lead to a reduction in noise and vibrations levels in the order of 10 dB(A) and more measurable in the city car provided. The overall expected results of the project are summarized as follows:

- Validation of the feasibility of an integrated noise & vibration control on vehicle level having
 - same interior noise, possibly reduced exterior noise with significant weight reduction and improved fuel consumption as compared to the state-of-the-art vehicle,
 - costs potentially competitive with conventional solutions,
- Provision of an integrated noise & vibration control on vehicle level resulting in significant less noise and vibrations levels at same weight and energy consumption,
- Increased modularity of integrated noise & vibration control,
- Increased acceptance of city cars with energy efficient powertrains from comfort point of view.

■ Project Plan, Milestones and Deliverables

Phase 1: M1 – M24

Adaptation of enabling technologies available within the consortium.

Phase 2: M13 – M36

implementation in a city car equipped with a two-cylinder engine and validation of the developed integrated solutions.

■ Technical Approach

Noise reduction technology will be developed and implemented on a city car decreasing the mass of the complete sound packages, using:

- New materials,
- Passive or active piezo-electric or electro-magnetic patches on vehicle and engine panels,
- Smart Helmholtz resonators,
- Broadband active noise cancellation,

applied to:

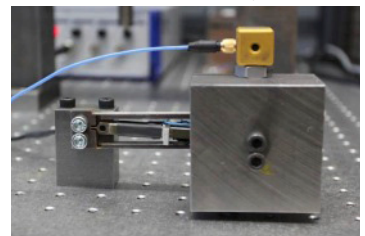
- Lightweight suspension brackets,
- Hybrid engine mount,
- Sound package,
 - Lightweight constrained layer damping metal structures,
 - Lightweight passive acoustic treatments,
 - Damped composite materials,
- Engine components,
- Intake system.

Furthermore, new low-noise tires optimized for the city car will be developed.

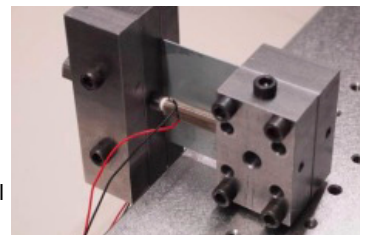
■ Achievements

- Adaptation and elaboration of enabling technologies:
 - shunted ceramics,
 - inertial mass actuators and electro-mechanical actuators,
 - adaptive Helmholtz resonators.
- New type of constrained layer damping treatment.
- Different designs of tyres for city cars.

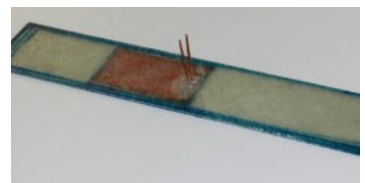
developed concepts and the implemented prototypes for active vibration control of a torque arm



Stroke amplified actuator



Bending beam



Disk spring

Budget 4.7 M€
Duration 36 months
DG Research / H4 – SST
Coordinator Thilo Bein, Fraunhofer
Partners FhG, CRF, VW, Continental Reifen, Rieter, Brüel&Kjaer, ISVR, Chalmers
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