

PROJECT

SMS

Smart Morphing and Sensing

Funding: European (Horizon 2020)

Duration: May 2017 - Apr 2020

Status: Complete

Total project cost: €3,991,688

EU contribution: €3,991,688



[CORDIS RCN : 209719](https://cordis.rcn.eu/209719)

Objectives:

Smart Morphing & Sensing is a multidisciplinary project associating novel electroactive actuators and sensors to increase aerodynamic efficiency and attenuate vibrations and noise. This is achieved via aerostructural morphing exploiting the real-time information from the distributed actuation and sensing systems. This goal is achieved by actuating the smart-materials to deform the structure according to optimum shape design by means of Flight Control Commands.

The novel "intelligent material" technology is a hybrid association of small piezo-actuators distributed along the control surface, of Shape Memory Alloys and of Electroactive Polymers, disposed under the 'skin' of the active structure. This novel hybrid design allows associating fast time response and vibrational actuation with simultaneous high deformation ability. The ability in capturing energy from the already existing vibrations and redistributing it in the actuation will be used to partially supply the system and therefore ensure an economic and realistic morphing. This is beyond the cutting edge of the state of the art in morphing concepts. The use of novel distributed pressure sensors based on fiber Bragg grating provides real-time information on the actuation performance and the flight situation enabling an efficient in-situ optimization using a dedicated controller interfacing the actuators with the fiber based sensors.

Aerodynamic and structural experiments are included to demonstrate the abilities of the new integrated smart sensing and morphing design via real-time actuation. High-fidelity aeroelastic computations are used to optimize the actuators location and function. The experiments will study the increase of the aerodynamic efficiency in cruise, take-off and landing by controlling the turbulence structure responsible for noise and vibration. The main configuration will be based on the Airbus A320 type wing with morphing flap.

Parent Programmes:

[H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

Institut National Polytechnique De Toulouse

Address:

6 allée Emile Monso
BP 34038 TOULOUSE
France

Organisation Website:

<http://www.inp-toulouse.fr>

EU Contribution: €932,500

Partner Organisations:

Cfd Software - Entwicklungs- Und Forschungsgesellschaft Mbh

Address:

Wolzogenstrasse 4
14163 Berlin
Germany

EU Contribution: €391,250

Scheller Technology Gmbh

Address:

POELER STRASSE 85A
23970 WISMAR
Germany

EU Contribution: €365,875

National Technical University Of Athens

Address:

Heroon Polytechniou 9 (polytechnic campus)
15780 ZOGRAFOS
Greece

Organisation Website:

<http://www.martrans.org>

EU Contribution: €248,750

Office National D' Etudes Et De Recherches Aérospatiales

Address:

29, avenue de la Division Leclerc
BP72 CHÂTILLON CEDEX
France

Organisation Website:

<http://www.onera.fr>

EU Contribution: €319,688

Instytut Maszyn Przeplywowych Im Roberta Szewalskiego Polskiej Akademii Nauk - Imp Pan

Address:

Ul. Fiszera 14
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Organisation Website:

<http://www.imp.gda.pl>

EU Contribution: €335,563

Novatem

Address:

3 RUE DE THIONVILLE
11110 COURSAN
France

EU Contribution: €349,688

Cfs Engineering Sa

Address:

Epfl Innovation Park Batiment A
1015 Lausanne
Switzerland

Organisation Website:

<http://www.cfse.ch>

EU Contribution: €331,250

Politecnico Di Milano

Address:

Piazza Leonardo Da Vinci 32
20133 Milano
Italy

Organisation Website:

<http://www.polimi.it>

EU Contribution: €377,375

Cementys

Address:

27 VILLA DAVIEL
75013 PARIS
France

EU Contribution: €339,750

Technologies:

Aircraft design and manufacturing
Morphing wing

Development phase: Research/Invention

STRIA Roadmaps: Vehicle design and manufacturing

Transport mode: Air transport

Transport sectors: Passenger transport, Freight transport

Geo-spatial type: Other