PROJECT

MADELEINE

Multidisciplinary ADjoint-based Enablers for LArge-scale INdustrial dEsign in aeronautics

Funding: European (Horizon 2020)

Duration: Jun 2018 - May 2021

Status: Complete

Total project cost: €5,815,181

EU contribution: €5,815,181

CORDIS RCN : 215996

Objectives:

MADELEINE will increase the TRL and demonstrate the benefits of high-fidelity (HiFi), adjoint-based multi-disciplinary optimisation (MDO) to address the objectives of industry in terms of:

- Competitiveness: by reducing time and cost of aircraft or engine development;
- Environment: by finding more efficient multi-disciplinary compromises and fostering the integration of greener technologies.

More specifically MADELEINE will:

- Upgrade the Capability of MDO, enhanced by HiFi simulations, to capture the essential interactions between disciplines and faster identify better designs or evaluate the potential of new technologies and disruptive configurations;
- Improve the Efficiency of MDO, because the efficient identification of designs, satisfying all disciplines' constraints, requires the exploration of large design spaces;
- Enhance the Usability of MDO for industrial design, through dedicated modelling, which will reduce the time to setup an MDO problem and exploit the results;
- Extend the Impact of MDO on cost reduction by including requirements from manufacturing.

The technologies (Multi-physics adjoint solvers, parameterisations, MDO formulations, High Performance Computing, manufacturing oriented design) will be demonstrated for airframe and engine design: aero-structure wing design, aero-acoustic fan and propeller design, manufacturing oriented aero-structure fan design and manufacturing oriented aero-thermal high-pressure turbine design. The TRL of MDO on large design spaces, with hundreds or thousands of parameters of optimisation, is expected to increase from 2-3 to 4-6.

MADELEINE will last 36 months (EC requested contribution of 5 815 182€), gathering partners from 6 EU countries: 5 universities, 4 research centres, 2 software companies (including 1 SME) and 3 large industries. Their complementary expertise is essential for the realisation of the technical work, for achieving a broad dissemination and a large impact on all industries.

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)

Other programmes: MG-1.3-2017 Maintaining industrial leadership in aeronautics

Lead Organisation:

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: €809,675

Partner Organisations:

L - Up Sas

Address:
Avenue De Friedland 32
75008 Paris
France

EU Contribution: €238,125

The University Of Sheffield

Address:
Firth Court Western Bank
Sheffield
S10 2TN
United Kingdom

Organisation Website:
http://www.sheffield.ac.uk

EU Contribution: €419,578

Stichting Centrum Voor De Ontwikkeling Van Transport En Logistiek In Europa

Address:
Van Nelleweg 1
3044 BC Rotterdam
Netherlands

Organisation Website:
http://www.cetle.org

EU Contribution: €396,090

Airbus Operations Sas

Address:
ROUTE DE BAYONNE 316
31060 TOULOUSE
France

Organisation Website:
http://www.airbus.com

EU Contribution: €301,613

National Technical University Of Athens

Address:
Heroon Polytechniou 9 (polytechnic campus)
15780 ZOGRAFOS
Greece

Organisation Website:
http://www.martrans.org

EU Contribution: €251,656

Technische Universitaet Muenchen

Address:
Arcisstrasse 21
80333 MUENCHEN
Germany

Organisation Website:
http://www.tu-muenchen.de

EU Contribution: €315,600

Esi Group

Address:
Avenue De Suffren 100-102
75008 Paris
France

Organisation Website:
http://www.esi-group.com

EU Contribution: €712,386

Università Degli Studi Di Cagliari

Address:
N/a
9124 Cagliari
Italy

EU Contribution: €250,583

Deutsches Zentrum Fr Luft Und Raumfahrt E.v

Address:
Linder Hoehe
51147 KOELN
Germany

Organisation Website:
http://www.dlr.de

EU Contribution: €405,240

Dassault Aviation

Address:
9, Rond-Point des Champs-Elysées - Marcel Dassault
75008 PARIS
France

Organisation Website:
http://www.dassault-aviation.com

EU Contribution: €356,158

University Of Southampton

Address:
Highfield
Southampton
SO17 1BJ
United Kingdom

Organisation Website:
http://www.soton.ac.uk

EU Contribution: €453,354

Optimad Engineering S.r.l.

Address:
Via Giacinto Collegno 18
10143 Torino
Italy

EU Contribution: €352,000

Irt Antoine De Saint Exupery

Address:
B 612 - CS 34436, 3 RUE TARFAYA
31400 TOULOUSE
France

EU Contribution: €394,375

Rolls Royce Plc

Address:
65 Buckingham gate
LONDON
SW1E 6AT
United Kingdom

Organisation Website:
http://www.rolls-royce.com

EU Contribution: €158,750

Technologies:

Unclassified
Non-technology

Development phase: Demonstration/prototyping/Pilot Production

STRIA Roadmaps: Vehicle design and manufacturing

Transport mode: Air transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Other specified

Geo-spatial type: Other