Multi-ObjecTive design Optimization of fluid eneRgy machines

Fact Sheet

Project Information

MOTOR
Grant agreement ID: 678727

Funded under
H2020-EU.2.1.1.
H2020-EU.2.1.5.1.

Project website

Overall budget
€ 4 302 875

EU contribution
€ 4 302 875

Start date
1 September 2015

End date
31 August 2018

Coordinated by
TECHNISCHE UNIVERSITEIT
DELFT
Netherlands

Objective

The MOTOR project focuses on ICT-enabled design optimization technologies for fluid energy machines (FEMs) that transfer mechanical energy to and from the fluid, in particular for aircraft engines, ship propellers, water turbines, and screw machines. The performance of these machines essentially depends on the shape of their geometry, which is described by functional free-form surfaces. Even small modifications have significant impact on the performance; hence the design process requires a very accurate representation of the geometry.

Our vision is to link all computational tools involved in the chain of design, simulation and optimization to the same representation of the geometry, thereby reducing the number of approximate conversion steps between different representations. The improved accuracy and reliability of numerical simulations enables the design of more efficient FEMs by effective design optimization methods. MOTOR also exploits the synergies between the design optimization technologies for the different types of
MOTOR adopts a modular approach for developing novel methodologies and computational tools and integrating them into real process chains, contributing:

- a volumetric mesh generator with exact interface matching for multi-domain geometries enabling high-order multi-physics simulations with enhanced accuracy,
- an isogeometric analysis simulation toolbox for CFD, CSM, and FSI problems and advanced interactive visualization toolkit for high-order solutions, and
- automatic shape optimization based on a multi-level approach in the parameterization enabling different levels of shape variety to combine design space exploration with local searches.

The effectiveness of our approach in terms of reduced time to production and increased efficiency of the optimally designed product will be validated by developing four proof-of-concept demonstrators with the modernized process chains.

Field of science

/natural sciences/computer and information sciences/computational science/multiphysics
/natural sciences/mathematics/pure mathematics/geometry
/natural sciences/physical sciences/astronomy/space exploration
/engineering and technology/mechanical engineering/vehicle engineering/aerospace engineering/aircraft

Programme(s)

Topic(s)

Call for proposal

H2020-FoF-2015

Funding Scheme

RIA - Research and Innovation action

Coordinator

TECHNISCHE UNIVERSITEIT DELFT

Address
Stevinweg 1
2628 CN Delft

Activity type
Higher or Secondary

EU contribution
€ 652 875
Participants (10)

CATERPILLAR PROPULSION PRODUCTION AB
Sweden
EU contribution
€ 91 250
Address
Langesand 1
475 22 Ockero
Activity type
Private for-profit entities
(excluding Higher or Secondary Education Establishments)
Contact the organisation

ESS ENGINEERING SOFTWARE STEYR GMBH
Austria
EU contribution
€ 493 875
Address
Berggasse 35
4400 Steyr
Activity type
Private for-profit entities
(excluding Higher or Secondary Education Establishments)
Contact the organisation

UNIVERSITAT LINZ
Austria
EU contribution
€ 307 500
Address
Altenberger Strasse 69
4040 Linz
Activity type
Higher or Secondary Education Establishments
Website
Contact the organisation

STICHTING MARITIEM RESEARCH INSTITUUT NEDERLAND
Netherlands
<table>
<thead>
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<th>Organisation</th>
<th>Country</th>
<th>EU contribution</th>
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<td>MAVEL AS</td>
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<td>Jana Nohy 1237, 25601 Benesov</td>
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<td>MTU AERO ENGINES AG</td>
<td>Germany</td>
<td>€400,625</td>
<td>Dachauer Strasse 665, 80995 Munchen</td>
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<td>ZAPAD Ceska Univerzita v Plzni</td>
<td>Czechia</td>
<td>€319,375</td>
<td>Univerzitni 8, 306 14 Pilsen</td>
<td>Higher or Secondary Education Establishments</td>
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**EU contribution**

- €511,250
- €248,000
- €400,625
- €319,375

**Website**

- Contact the organisation
Germany

EU contribution

€ 398,125

Address
August Schmidt Strasse 4
44227 Dortmund

Website [open]

Activity type
Higher or Secondary Education Establishments

Contact the organisation [open]

TECHNISCHE UNIVERSITAT KAIERSLAUTERN

Germany

EU contribution

€ 430,000

Address
Gottlieb Daimler Strasse
67663 Kaiserslautern

Website [open]

Activity type
Higher or Secondary Education Establishments

Contact the organisation [open]

INSTITUT VON KARMAN DE DYNAMIQUE DES FLUIDES

Belgium

EU contribution

€ 450,000

Address
Chaussee De Waterloo 72
1640 Rhode Saint Genese

Website [open]

Activity type
Research Organisations

Contact the organisation [open]

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Record number: 198350

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