Development of Experimental Techniques and Predictive Tools to Characterise Thermo-Mechanical Fatigue Behaviour and Damage Mechanisms

Fact Sheet

Project Information

DevTMF

Grant agreement ID: 686600

Project website

Status

Ongoing project

Start date

1 February 2016

End date

31 January 2021

Funded under H2020-EU.3.4.5.5.

Overall budget

€ 994 538,75

EU contribution

€ 994 538,75

Coordinated by LINKOPINGS UNIVERSITET

Sweden

Objective

DevTMF takes the collective technical expertise and experience of working on thermo-mechanical fatigue (TMF) problems related to large aero-engines from three major centres of TMF research, namely Linköping, Swansea and Nottingham Universities in order to perform the activities of this topic. Together, the team will deliver significant technical innovations in following major topics to ensure world-leading competencies in aero engine and aircraft manufacturing sector for Europe:

1. Improvement and development of advanced standard and non-standard cutting-edge TMF experimental methods and harmonisation of the test methods to enable standardisation across the field by performing comprehensive studies into the
phenomena for a range of representative parts,
2. Advanced metallurgical assessment of structural disc alloy(s) taking into account the effect of multiple critical variables (e.g. R-ratio, phase, environment, dwell) to determine active damage mechanisms that control the life under TMF operating conditions, and
3. Physically based coupled models, with experimental validation, capable of predicting TMF initiation and propagation lives of components subjected to complex engine cycles and suitable for implementation in the computer programmes used to predict component lives.

The project will take the above-described technologies to TRL5. Two business opportunities are addressed by this work: (i) at the end of the project the materials understanding and lifing models will be used to optimise/uprate the performance of existing individual aero engine components and (ii) over a longer timescale influence the development of new disc alloys and ultra efficient future designs (Advance, Ultrafan). The developed TMF technologies will enable industrial aero gas turbines used for aero engines to be operated at higher temperatures and pressures, improving their efficiency and reducing fuel consumption (by 1%) and CO2 emissions. Hence improved competitiveness and market share.

Field of science

/engineering and technology/environmental engineering/energy and fuels/fossil energy/gas
/social sciences/economics and business
/engineering and technology/mechanical engineering/vehicle engineering/aerospace engineering/aircraft

Programme(s)

Topic(s)

Call for proposal

H2020-CS2-CFP01-2014-01

Funding Scheme

CS2-RIA - Research and Innovation action

Coordinator
**LINKOPINGS UNIVERSITET**  
**Address**  
Campus Valla  
581 83 Linkoping  
Sweden  

**Activity type**  
Higher or Secondary Education Establishments  

**EU contribution**  
€ 343 873,75  

Contact the organisation [link]

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**Participants (2)**

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**SWANSEA UNIVERSITY**  
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Singleton Park  
SA2 8PP Swansea  

**Activity type**  
Higher or Secondary Education Establishments  

**EU contribution**  
€ 457 735  

Contact the organisation [link]

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**THE UNIVERSITY OF NOTTINGHAM**  
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University Park  
NG7 2RD Nottingham  

**Activity type**  
Higher or Secondary Education Establishments  

**EU contribution**  
€ 192 930  

Contact the organisation [link]

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