Numerical modelling of failure development within TBC systems

Fact Sheet

Project Information

TBC FAILURE

Grant agreement ID: 36548

Project closed

Start date
1 August 2006

End date
31 July 2007

Funded under
Human resources and Mobility in the specific programme for research, technological development and demonstration "Structuring the European Research Area" under the Sixth Framework Programme 2002-2006

Total cost
No data

EU contribution
€ 40 000,00

Coordinated by
THE INSTITUTE OF FUNDAMENTAL TECHNOLOGICAL RESEARCH, POLISCH ACADEMY OF SCIENCES
Poland

Objective

The scientific objective of the project is a development of new methods for a prediction of service life times of a single crystal Ni-based super-alloy used in the design of heavy industrial gas turbines. Under operation conditions turbine blades

experience complex loading, combined with the existence of residual stresses and oxidation processes. The improvements in increasing the efficiency of gas turbines have been partially achieved by applying thermal barrier coatings (TBCs) on turbine blades. However, the mechanisms leading to failure and the parameters limiting coating lifetime have not been fully revealed so far. Finite element simulations of failure development within TBCs will be performed. They are aimed to be a continuation of works performed by Dr Bialas during his Marie Curie Intra-Fellowship in the Research Centre Juelich (FZJ).

In this context the project's goal is also to further promote an on-going co-operation between FZJ and the Institute of Fundamental Technological Research (IFTR), Warsa w, dr Bialas' mother institution in Poland. The project will enable an interdisciplinary co-operation between theoretically oriented structural mechanics and the experimentally oriented materials science at FZJ and thus, contribute to an increase of scientific excellence in Europe. It will also help to create a group of researchers at IFTR working with thin films technologies and to adapt the methods learned by Dr Bialas during his fellowship to other engineering topics, which are generally connected to interfacial damage problems. Mechanical modelling of constituents of TBC systems will be performed with the main goal of a further development of the TBC failure model based on the cohesive zone concept. Anisotropic and time dependent mechanical response of C MSX-4 Ni-based super-alloy and its influence on stress distribution within TBC will be a major scientific objective. The technology of cooling holes will be also addressed.

Fields of science (EuroSciVoc)

natural sciences > chemical sciences > electrochemistry > **electrolysis**

engineering and technology > materials engineering > **coating and films**

natural sciences > mathematics > applied mathematics > **mathematical model**

Keywords

damage evolution | gas turbine | life time prediction | simulation | thermal barrier coatings

Programme(s)

FP6-MOBILITY - Human resources and Mobility in the specific programme for research, technological development and demonstration "Structuring the European Research Area" under the Sixth Framework Programme 2002-2006

Topic(s)

MOBILITY-4.1 - Marie Curie European Reintegration Grants (ERG)

Call for proposal

FP6-2004-MOBILITY-11
See other projects for this call

Funding Scheme

ERG - Marie Curie actions-European Re-integration Grants

Coordinator

THE INSTITUTE OF FUNDAMENTAL TECHNOLOGICAL RESEARCH, POLISCH ACADEMY OF SCIENCES

EU contribution

No data

Total cost

No data

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Links

Contact the organisation Website
HORIZON collaboration network

Last update: 23 March 2009