

Projects

Written by Kamoutsi Eleni

Sunday, 20 March 2016 20:05 - Last Updated Sunday, 17 November 2019 15:27

[1] *Optimization of Microstructure in Multiphase Steels Containing Retained Austenite /Control and Exploitation of the Bake Hardening Effect in Multiphase High-Strength Steels* (2000-2006). Funding

organization

: European Community of Steel and Coal (ECSC).

Partners

: Steel Companies (Thyssen Krupp Stahl, Voest Alpine, Arcelor Group), Universities (RWTH-Aachen, Univ. Ghent). Research is focused in developing a new class of high strength high-formability steel sheet for automotive applications. These new TRIP steels are based on the strain-induced martensitic transformation of retained austenite (transformation plasticity). Topics investigated include: austenite stabilization, modeling and determination of austenite stability, modeling of strain-induced transformation, bake hardening effects, computational kinetics modeling of intercritical annealing.

[2] *Corrosion and Hydrogen Embrittlement of Aircraft Aluminium Alloys* (2002-2004). Funding organization

: Airbus Consortium.

Partners

: Univ. Patras. The objective of the research is to investigate hydrogen uptake and trapping during corrosion of Al-alloys. Trap characterization is performed by combining thermal desorption measurements with microstructural characterization employing optical and scanning electron microscopy as well as AFM. The effect of hydrogen trapping is quantified with tensile, fracture toughness and fatigue testing.

[3] *Simulation of Extrusion and Heat treatment of Hard Aluminium Alloys*. Funding organization

: GSRT.

Partners

: Exalco Aluminium Company. Research is focused in modeling the discrete steps in aluminium extrusion processing, i.e. casting and billet solidification, development of microsegregation, homogenization, extrusion, dissolution, and ageing. These models are linked and

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interdependent. A detailed microstructural characterization after every processing step supports the modeling effort.

[4] *Microstructural Evolution in the Heat Affected Zone of Aluminium Laser Welds* (1998-2004).

Funding

organization

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GSRT. Research is focused on the application of computational thermodynamics and kinetics combined with FEM-based thermal analysis for modeling of dissolution, precipitation and coarsening of strengthening phases during the ultra-rapid thermal cycle encountered in laser welding of high-strength aluminium alloys such as 6061-T6. The effect of process parameters is investigated in an effort to design efficient and reliable laser welding techniques for aircraft and automotive aluminium alloys.

[5] *Control and exploitation of the bake-hardening effect in multi-phase high-strength steels* (2002-2005).

Funding Organization

: European Community of Steel and Coal (ECSC).

Partners

: Steel Companies (Thyssen Krupp Stahl, Voest Alpine, Arcelor Group), Universities (RWTH-Aachen, Univ. Ghent). Research is focused on the investigation of further strength improvements in TRIP steels via the bake hardening effect. Modelling of carbon segregation in austenite during the bainitic transformation of TRIP steels. Modelling of retained austenite volume fraction vs bainite isothermal transformation time.

[6] *Aeronautical Application of Wrought Magnesium - AEROMAG* (2005-2009). Funding

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organization

EU-STREP. Research is focused on the deformation and fracture mechanisms as well corrosion mechanisms of wrought Mg alloys .

Partners

: EADS-Airbus, Salgitter, Magnesium Electron, Eurocopter, et al.

[7] *Design of Bainite in TRIP Steels (2007-2010)*. Funding Organization: EU-Research Fund for Steel and Coal (RFCS).

Partners

: Steel Companies (Thyssen Krupp Stahl, Voest Alpine), Universities (RWTH-Aachen, CEIT). Research is focused on the modeling of bainitic transformation for the design of alloy compositions and heat treatment processes that lead to austenite stabilization and optimize the mechanical performance of TRIP steels.

[8] *On-line optimization of production methodology of solar thermal systems – SUNLASER (2011-2013)*. Fundi

ng organization

: GSRT.

Partners

: Prime Laser Technology, Cereteth, FORTH-IESL. Research is focused on the evaluation of the bimetallic Al-Cu laser welds used in the construction of advanced solar panels. Evaluation includes metallographic analysis of weld metal constitution and characterization of intermetallic compound distribution and correlation with mechanical properties.

[8] *Evaluation and Control of Rolling Contact Fatigue in Rail Steels - DECORAIL (2013-2015)*.

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Funding Organization

: GSRT.

Partners

: Urban Rail Transports S.A. (STA.SY), Demokritos National center for scientific research. The program is focused on the evaluation of RCF damage in rail steels (crack initiation and propagation through the rails) and the evaluation of failure scenarios in order to develop a methodology for the total control of RCF in the system of Athens Metro.

[9] *Design Rules for Third Generation (3G) Advanced High Strength Steels* – IKYDA (2014-2015).

Fundi

ng Organizations

: IKY and DADD.

Partner

: Institute for Ferrous Metallurgy, RWTH-Aachen. Research is focused on the development of new medium-Mn advanced high-strength steels with austenitic dispersions for transformation plasticity interactions. Computational thermodynamics and kinetics-based design of alloy compositions and heat treatments. Modelling of strain-induced martensitic transformations in dispersed systems.

[10] *Toolkit for the design of damage tolerant microstructures*- TOOLKIT (2016-2019). Funding Organization

: EU-Research Fund for Steel and Coal (RFCS).

Partners

: Steel Companies (Thyssen Krupp Stahl, OCAS, Korinth Pipeworks), Universities (RWTH-Aachen, University of Ghent). The project aims at developing microstructural configurations that provide the required properties for damage tolerance in dual phase and HSLA steels. Design of suitable processing parameters to achieve the tailored microstructures (in collaboration with Prof. N. Aravas).

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[11] *Development of affordable integrated lightweight components from flexible 3G medium-Mn steels* – LightChassis (2017-2020). Funding Organization: Research Fund for Steel and Coal (RFCS). Partners:

Salzgitter Mannesmann Forschung, Autotech Engineering, RWTH-Aachen, Centro Ricerche FIAT, ISQ). The project aims to design and deliver chassis components made from novel 3rd

generation advanced high-strength medium-Mn steels. Computational alloy design will be applied in order to determine optimum alloy compositions and process windows. The alloy will be produced by novel belt casting technology. The component design will include detailed forming and welding analysis.