EUROMAT 2019 / Area B: Structural Materials

SYMPOSIUM: B8

Title: High Temperature Material Characterisation, Testing and Mechanical Properties

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Abstract

Critical damage mechanisms for high temperature components in a range of applications (aero engines, land-based gas turbines, heavy-vehicle engines, pressure vessels and piping, fusion reactors, brake rotors) require accurate and representative test data in order to develop accurate modelling and lifing approaches. These in-service environments can be characterised by deformation under both isothermal and non-isothermal conditions where materials are subjected to severe complex mechanical and thermal loads through their life cycle, with the challenge being to then relate this behaviour to microscale material properties.

Characterising non-isothermal high temperature behaviour has historically proved difficult due to the experimentally challenging nature of testing, however, development of codes of practice (e.g. for strain/stress controlled thermos-mechanical fatigue) and international standards (i.e. strain controlled thermo-mechanical fatigue) have improved reliability in data, allowing for improved life prediction methodologies. Similarly, high temperature behaviour in arduous environments has often suffered from a lack of available data, although recent developments in experimental techniques have allowed more accurate

characterisation.

Therefore, the goal of the High Temperature Material Characterisation, Testing and Mechanical Properties Symposium is to review latest advancements related to mechanical properties of structural materials and relationships to their microstructure at high temperatures. Material focus areas include today's superalloys, next generation superalloys, ferrous materials, composites, refractory metal-based alloys, intermetallics, ceramic-based systems and various coatings for the above mentioned materials.

Topics of interest include, but are not limited to:

- Mechanical properties of alloys at high temperatures (e.g. fatigue, creep),
- Thermo-mechanical fatigue,
- High temperature deformation and fracture mechanisms,
- Crack initiation and propagation,
- Environmental properties (e.g. oxidation, corrosion)
- Fracture and fatigue,
- High temperature deformation mechanisms,
- High temperature damage mechanisms,
- Interaction between mechanical properties (e.g. creep-fatigue, oxidation-fatigue, overload), and
- High temperature modelling and prediction.