

Scientific assistant – Material characterization and modelling

With around 8,200 students, Brandenburg Technical University (BTU) Cottbus-Senftenberg is the second largest and the only technical university in the federal state of Brandenburg. It is a research-oriented technical university that offers excellent research opportunities. In the **Chair of Mechanical Design and Manufacturing** of the **Faculty of Mechanical Engineering**, we are looking for a candidate as

Scientific assistant (m/w)

for a fixed term contract with a possibility of obtaining a doctoral degree.

The remuneration is paid according to salary level 13-TVL.

The position is full-time and comprises 40 hours per week.

Project description:

Low-pressure turbine blades made of titanium aluminides (TiAl) are currently being used in two- or three-shaft engines for commercial aircraft with the aim of reducing the heavy iron- and nickel-based alloys in high-temperature range. Two-stage isothermal forging is currently used for the production of turbine blades where the process lasts for several minutes. Due to the strong anisotropic and inhomogeneous deformation of two- and three-phase TiAl alloys, the forming can only be carried out in a narrow temperature range. During this process, TiAl alloys show a steep drop in the flow stress after achieving a pronounced maximum yield stress even at low deformation rate. The strong softening process can be used to expedite the forming process. The present project aims at the possibilities of the process acceleration through adaptive speed control of the isothermal forging processes. With the precise knowledge of the softening kinetics and deformation limits under transient forming conditions, isothermal forging processes with a speed control adapted to the respective microstructure could be carried out in a much shorter time. Moreover, suitable heat treatment strategies have to be investigated in order to establish an optimal structure before and after forging.

Specific responsibilities:

- To understand the deformation behaviour of multiphase TiAl alloys at a constant and variable deformation rates under hot forming conditions on the basis of microstructural mechanisms
- To investigate the influences of different phase components of TiAl alloy on the post-forming microstructure with constant and variable deformation rates
- To develop a microstructure-based model for the isothermal forging behaviour and damage initiation

Requirements:

- Master's degree in Mechanical Engineering or Materials Science
- Hands-on knowledge of material characterization techniques
- Capability to understand material microscopic features like microstructure, phase components, grain size etc. and correlate them with macroscopic mechanical properties
- Interest in material model development
- Ability to interpret and report scientific results

Applicants should submit their curriculum vitae with a letter of application, copies of all relevant degree certificate(s), experience and recommendation letters via E-mail to:

Prof. Dr.-Ing. habil. Markus Bambach, E-mail: bambach@b-tu.de

BTU Cottbus-Senftenberg

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