

Postdoctoral fellowship (18 months)

Hot cracking mechanisms in welding process and associated microstructure formation

Background:

As part of the ANR project NEMESIS (*NumErical MEtallurgy Supporting arc welding processeS*), the objectives are to elucidate mechanisms of welding defects occurrences on metallic materials, especially hot cracking phenomena and brittle phase formation. In-situ experimental observations will investigate grain growth and hot cracking mechanisms in welding condition in order to determine a local criterion leading to defects development.

Another objective is to improve the understanding of the microstructure formation and the development mechanism of associated defect occurring on industrial alloys in welding conditions. Notably, competition between epitaxial grains proceeds in steep temperature gradients and large growth velocities leading to the development of specific microstructure are encountered. This microstructure and associated hot-cracking defects require to be investigated on an in-situ equipment to follow fast solidification evolution and to perform surface strain measurement. These analyses should provide a well suited estimation of hot cracking criteria for a given stress condition. Post-mortem analysis should also deliver a reliable estimation of brittle phase development on the same materials.

ICB/LTM Presentation:

The laboratory ICB (Interdisciplinary Carnot of Burgundy) is a large gathering of researchers with 300 Physicists, Chemists, Engineers and Technicians. Based in Le Creusot (approximately 50 miles from Dijon), the LTM (Laser & Treatments of Materials) team is specialized in welding especially in the development of Laser Welding. The LTM team has a long experience in the instrumentation of processes such as arc or Laser welding or the combination of both. In particular, the LTM team has led research concerning study on hot cracking in conditions of Laser Welding and focused on the study of dissimilar materials welding these last years. The LTM team implements research concerning joining processes and their effects in matter. Research is conducted within a very well-endowed experimental platform.

Profile:

In this aim, we are currently seeking the opportunity to recruit a postdoctoral research associate in Materials Science. As a postdoctoral research associate, you will contribute to conduct in-situ experimentations on a test bench especially designed to observe hot cracking mechanisms in conditions close to the welding process ones in order to identify a local criteria leading to defects development.

Requirements:

- PhD in Materials Science, ideally with metallic materials in a welding context
- With good notions in continuum mechanics
- With a keen interest in techniques such as Digital Image Correlation and fast imaging

Key roles and activities:

- To conduct a target research project in materials Science
- To carry out experimentations on a test bench with associated instrumentation such as cameras, sensors
- To characterize microstructure of tested samples
- To analyze results and observations
- To report on carried out experimentation, metallurgical characterization and hot-cracking phenomena observation

Mobility:

No travelling

Contact:

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Beginning:

April-Mai 2018

Salary:

2000 €/month