Metallurgical risk factors in power plant steels

PhD

Funding: EPSRC funded for 3.5 years for UK/EU students, plus industrial top up

Supervisor: Dr Geoff West, Professor Barbara Shollock, and John Siefert (Electric Power Research Institute, USA)

Supporting company: Electric Power Research Institute (EPRI)

Start date: 1 October 2017

Project Overview:
An exciting opportunity to work as part of our Advanced Steel Research Centre (ASRC) at WMG, University of Warwick, an internationally leading centre for steel research. The ASRC is located in the new Advanced Manufacturing and Materials building and has benefited from a multi-million pound investment in new equipment.

The steels processing group consists of five academic staff, over ten research fellows, and more than twenty PhD students working in steel processing, characterisation and applications. You will join a rapidly expanding group with opportunities for collaborative as well as individual research, and benefit from new facilities and a supportive environment. The ASRC has strong links with industry, with many projects being sponsored and opportunities exit for placements within industry.

Grade 91 and Grade 92 are 9%Cr creep strength enhanced ferritic (CSEF) steels and have been installed in replacement and state-of-the-art components in the power generation industry over the last 20 years. Recently, metallurgical risk factors have been identified in Grade 91 and Grade 92 steels. These risk factors contribute to accelerated development of damage under multiaxial states of stress. There is a desperate need to establish robust procedures using available quantification techniques which can identify these risk factors for statistically relevant datasets to assist life management of existing assets as well as provide recommendations to industry for improvement in the quality of the end product form.

This project aims to link the as-received and post-test condition using state-of-the-art advanced electron microscopy tools. A key goal of this project is to link particles in the steels, which can include inclusions, intermetallic phases, tramp elements or carbonitrides, to the observed damage and will include linking the relevance of both surface-breaking and subsurface assessments. Due to the vital nature of this work and its expected impact on the power generation industry, multiple opportunities to communicate the results through worldwide conferences, workshops, key Code meetings and other venues will be encouraged. Publication of the research will be equally vital to this effort and the industrial partner is very keen to assist the student in writing and submitting publications to leading journals in the field.

The project provides an outstanding opportunity to be involved in cutting-edge research to optimize widely used 9%Cr steel CSEF steels for state-of-the-art power plants, and gives valuable exposure to a major area of industry. This project is expected to have massive implications to the industry and is fully sponsored by the Electric Power Research Institute (EPRI).

Entry Requirements
Candidates should have a minimum of an upper second (2.1) honours degree (or equivalent) in Materials Sciences (including Metallurgy, Ceramics), Chemical Engineering, Chemistry, Geology or related disciplines. A good command of English is essential for the position.

Funding
Funding is available for UK/EU students. A stipend of £14,296 plus industrial top up of £3,000 will be paid per annum for 3.5 years.
To apply
For informal inquiries about the project, please contact either Dr Geoff West or Professor Barbara Shollock by email in the first instance.

To submit an application, please complete our online enquiry form

This is a COMPETITIVE application process and a formal application must be completed. Please ensure you meet the minimum requirements before filling in the online form. The information supplied will then be sent for review to assess your suitability and interviews will be conducted.

As part of the application, please supply your CV, grades and qualifications (achieved and/or expected), and a project plan and/or personal statement on why you think you should be considered for this position. Written references do not need to be supplied but may be sought after shortlisting with your permission. The awardee will however be required to supply satisfactory references at the acceptance stage.