Weld repair and in service damage 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.

Weld repair of power generation steels remains a vital part of the life management process. As power plants operate worldwide under ever more aggressive conditions with respect to both temperature and flexible operation (e.g. cycling) there is an increasing need to develop innovative weld repair procedures to mitigate damage. Materials which require repair include both traditional low alloy steels (such as Grades 11, 12, 22), creep strength enhanced ferritic steels (predominately Grades 91 and 92) and dissimilar metal welds (DMWs).

This project aims to link the as-simulated repair condition to the post-test condition using state-of-the-art advanced electron microscopy tools. Post-test samples include a range of cross-weld creep tests including large, feature type tests, repairs tested in pressure vessels and ex-service repairs. A key goal of this project is to link the observed damage in the heat affected zone of the post-test repair welds to the observed distribution of particles, grain size/features and other relevant pre-test observations in the repair welds. This assessment is expected to have an enormous impact on the power generation industry and as such the student will be encouraged to communicate the results of this research project through worldwide conferences, workshops, key Code meetings and other venues. 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 newly developed weld repair procedures for low alloy and 9%Cr 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 an immense 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.