

## Engineering Doctorate Postgraduate Position in the Energy Materials, Faculty of Engineering

Sponsored by EDF Energy, Coal Gas and Renewables, UK

### **Project: Development of Life Assessment Models Using In-Service Inspection Data**

The safe operation of high temperature pressure systems in conventional power plant in the UK faces numerous challenges associated with ageing materials and maintaining commercial viability whilst the UK economy de-carbonises in line with commitments on climate change of an 80% reduction in total greenhouse gas emissions by 2050. Current UK policy aims to replace the old coal fired Power Stations with new and higher efficiency gas stations by 2025. As large coal stations edge closer to closure there will be more emphasis on the availability and performance of, combined cycle gas turbine (CCGT) stations, which is essential to ensuring safe and reliable generation in the UK during the transition to a low carbon economy. For the plant operator, there are increasing pressures to ensure that any capital or operational expenditures on operating plant are fit-for-purpose, recognising material age, condition and operating regime.

The proposed research in this Engineering Doctorate (EngD) project is aimed at utilising the plentiful supply of in-service site metallurgical/inspection and operational data to improve the predictive capability of current life assessment models. The ultimate aim is to develop 'point of application' material models that can seamlessly use site metallurgical/inspection and operational data from the station to provide the operator with a timely and predictive life assessment capability. It is anticipated that this research will involve developing modified creep and creep-fatigue models that utilise data such as surface hardness and creep replicas and likely coupled to results from miniature specimen tests. In addition, site operational data will be used throughout to support the development and demonstration of predictive computational models. The project will focus on the application for Grade 91 steels which are used extensively in CCGT heat recovery steam generators (HRSG's) and associated high temperature pipework systems.

### **The PhD Scholarship**

The students must have a high-grade qualification, at least the equivalent of a UK 1<sup>st</sup> or 2.1 class degree in an engineering or science discipline (e.g. mechanical /materials /manufacturing engineering or applied mechanics). The students must be proficient in both written and spoken English, possess excellent presentation and communication skills and be able to write technical reports and academic papers. High level background of solid mechanics and computational modelling is advantageous.

The EngD project is of four years duration, starting October 2017. The studentship is available only to UK/EU citizens, which will cover full university fees and a tax-free, enhanced annual stipend of £18,796, to UK candidates, and an annual stipend of £14,553, to non-UK EU candidates.

Academic supervisors: Prof Wei Sun; Prof Phil Shipway, Faculty of Engineering, University of Nottingham.

Industrial Supervisor: Prof Andy Morris, Chief Mechanical Engineer, EDF Energy Coal Gas and Renewables.

### **Contacts and Application**

Informal enquiries may be addressed to Prof W. Sun ([w.sun@nottingham.ac.uk](mailto:w.sun@nottingham.ac.uk)). For detailed information on the EPSRC Centre for Doctoral Training in Carbon Capture and Storage and Cleaner Fossil Energy, please visit [www.ccscfe-cdt.ac.uk](http://www.ccscfe-cdt.ac.uk)

To apply please send your CV and covering letter to [ccscfe@nottingham.ac.uk](mailto:ccscfe@nottingham.ac.uk)