UNIVERSITY OF OXFORD

New Dimensions of Engineering Science at Large Facilities

EPSRC studentship for doctoral study

The project is aimed at extending the capabilities of characterising stress and strain, texture and microstructure in engineering components and structures using the new experimental capabilities and inverse analysis procedures at major research facilities: JEEP beamline at Diamond synchrotron, ENGIN-X spectrometer at ISIS (both on the Harwell Science and Innovation Campus near Oxford), as well as the ID15 high energy beamline at the ESRF (Grenoble).

The specific project objectives are:

- To undertake a series of measurements on engineering samples using various experimental setups: (i) novel 'horseshoe' energy dispersive detector on JEEP at Diamond, (ii) twin detectors on ESRF ID15A and HEXameter (Oxford lab system), and (iii) pixellated neutron TOF transmission detectors on ENGIN-X at ISIS

- To develop systematic approaches to the deconvolution of three-dimensional, multi-component deformation and texture data from redundant multiple detector spectra from high energy X-ray and neutron diffraction ("strain tomography")

- To implement the new approaches in the form of near-online software allowing quick analysis and progressive improvement of strain state evaluation

- To link post-processing analysis procedures to advanced theories of structure and residual stress evolution implemented within the framework of finite element analysis

The successful applicant with have or acquire expertise in the use of a broad range of experimental characterisation techniques, including X-ray diffraction, microscopy and imaging. Familiarity with data and image processing and interpretation algorithms will be an advantage, as well as the ability to use relevant toolboxes and packages, such as Matlab, IDL, Mathematica. The principal simulation tool used in the project will be finite element modelling, and experience in the use of this technique will be welcomed.

Prospective applicants should contact Professor Alexander M. Korsunsky as soon as possible – email alexander.korsunsky@eng.ox.ac.uk