



UNIVERSITY OF
BIRMINGHAM

School of Metallurgy and Materials

A microstructure-informed model to predict the deformation and shear bands formed during a nickel superalloy machining operation

The School of Metallurgy and Materials is seeking a high calibre candidate for a fully funded PhD studentship in materials modelling.

The PhD is sponsored by Rolls-Royce plc and will be supervised through the Partnership for Research in Simulation of Manufacturing and Materials (PRISM²) modelling group within the School of Metallurgy and Materials. PRISM² is a research centre at the University of Birmingham, with expertise in the modelling of materials, manufacturing and design for high technology applications in the aerospace and power generation sectors. The project will focus on developing state-of-the-art modelling tools and capabilities to simulate the response of materials during manufacture.

Aerospace manufacturers utilise machining and bulk material cutting operations widely to produce complex metallic components for aeroengine applications. In particular, nickel superalloys are an important family of materials within aerospace machining operations. Numerical and computer-based modelling of such processes has increased in importance to the industry with the developments of so-called integrated computational materials engineering methods, whereby microstructure-level variations can be included within modelling strategies to determine their effect upon the large-scale (macro-scale) machining operation.

The PhD project would see the student working toward creating a physics-based simulation framework, considering the correct physical phenomena from both a materials and a processing basis, to allow for an integrated modelling methodology to link the microstructure evolution to the macro-scale process.

The successful candidate for this PhD project will have an undergraduate degree in either Metallurgy, Materials Science, Mechanical or Civil Engineering or a physical science subject, possess a strong understanding of metallic alloy systems (preferably nickel-based superalloys), a good background understanding of computer coding, will be proficient in one or more coding languages including python, fortran, C++ and possess very good numeracy skills.

Any enquiries should be made to Dr Hector Basoalto H.Basoalto@bham.ac.uk