

Self-funded PhD opportunities at the Advanced Manufacturing Technology (**AMT**) research group, Department of Mechanical and Construction Engineering, Faculty of Engineering and Environment, Northumbria University, Newcastle Upon Tyne, UK

Project Title:

Development of Metallic Powder fibre reinforced Sintered parts by Additive Manufacturing

Project Description [300 words]

(Please include links to further web page information in this section, if needed)

The structural and thermal properties of a component is critical to its performance, for example heat exchangers and heat pipes. Additive Manufacturing [AM] allows new designs to be achieved/manufactured and providing efficient but complex flow paths. However, to-date the metal powders to part production route has required high cost laser systems operating in inert atmospheres, this research will focus on the development of material combinations capable of manufacturing a metal matrix composite with fibre reinforcement

The objectives of this project are:

- [1]. Investigate alternative design and materials and material combinations for potential technology improvement at the design stage. Alternative materials are being used in a for example DirectMetal™ system, however the composite manufacturing capability is limited to as 20% shrinkage occurs in the process of sintering
- [2]. Develop a new AM process capable of producing polymer composite components with fibre reinforcement, using an extrusion process.

Hence the proposed study will clearly be novel being the first of its kind to explore alternative materials for technology improvement opportunities aimed at highly conductive, functional graded reinforcing components hence mechanically and thermally efficient designs.

The candidate should have knowledge or at least an interest in:

- Design and Structural analysis
- Additive manufacturing
- Systems design

Faculty: Engineering and Environment

Department

Mechanical and Construction Engineering

Principal Supervisor

Dr Phil Hackney

Recent publications by supervisors relevant to this project

Dr P Hackney, Dr R Wooldridge, Optimisation of Additive Manufactured Sand Printed Mould Material for Aluminium Castings, Flexible Automation & Manufacturing Conference, FAIM2017 Modena Italy, 2017

Dr P Hackney, Dr R Wooldridge, "Additive Manufacturing for Automotive Mass Production Tools", 14th Rapid Design, Prototyping and Manufacturing Conference, Loughborough University 2016

Dr P M Hackney, Mr C Ainsley, " Rapid Manufacturing – State of the Art, Analysis and Future Perspectives.", International Conference on Advanced Manufacturing 2011 (ICAM 2011).

Eligibility and How to Apply

Qualification

Applications are invited from exceptional candidates who have a good first or upper second class degree (or equivalent) in engineering, materials science. Students who are not UK/EU residents are eligible to apply, provided they hold the relevant academic qualifications, together with an IELTS score of at least 6.5. This project is well suited to motivated and hard-working candidates with a keen interest in design, materials and manufacturing. The applicant should have excellent communication skills including proven ability to write in English.

For more information and informal enquiries please contact Dr Phil Hackney

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Deadline for applications:

- 1st December for March (following year) start; 1st June for October (same year) start.

Start Date: March and October of each year