



Job title	Research Associate/Fellow in Additive Manufacturing of Multi-Metallic Structures based on Refractories	Job family and level	Research Level 4 (Appointment will be Level 4 Career training grade where an appointment is made before PhD has been completed)
School/ Department	Engineering - Centre for Additive Manufacturing	Location	Jubilee Campus, Advanced Manufacturing Building

Purpose of role

The role holder will be part of a team working on the topic of new multi-metallic structures for nuclear fusion applications as part of the project “Design of Interfaces for Additively Engineered Metamaterials” led by Dr Marco Simonelli at the University of Nottingham. The role will support the Investigator team in achieving overall research objective of Additive Manufacturing (AM) defect-free refractory metals that interface with heat sinks made of conductive materials.

The role holder will conduct internationally leading research towards the goal of widening the understanding of multi-metallic printing via laser powder bed fusion, the most prominent metal AM technique. The successful applicant will make use of a state-of-the-art printing platform that features a novel Schaeffler-Aerosint powder selection deposition recoater and a multi-laser beam heat delivery. This research will require the development of precise printing parameters (comprising: material recoater, (multi-) laser fluence, laser scanning strategy, deposition sequence, etc.) to fabricate defect-free tungsten (W), as well as the identification of suitable printing parameters to create robust interfaces with a dissimilar material, specifically copper (Cu) alloys. The targeted engineering components that will be designed and fabricated in this research project will be chosen within the context of nuclear fusion and divertor applications.

	Main responsibilities (Primary accountabilities and responsibilities expected to fulfil the role)	% time per year
1	<p>Contribution to printing and testing of multi-metallic additive manufactured structures.</p> <ul style="list-style-type: none"> The successful applicant will be required to determine printing parameters for individual materials (tungsten-W and copper-Cu) and W/Cu interfaces. They will characterise the microstructure and the high-temperature performance of the printed W/Cu structures. They will determine fabrication guidelines for W/Cu structures to ensure low-defect production. They will be required to produce specimens of increasing geometrical complexity (targeting nuclear fusion divertor componentry) They will develop finite element models of the identified engineering components with a view to optimise W and Cu distributions in 3D. 	75%

2	<p>Documentation and reporting</p> <ul style="list-style-type: none"> • The role holder will be responsible for ensuring that their work is thoroughly documented such that other researchers can advance this work either simultaneously or subsequently. This applies to any computer programming done as well as design calculations and development of research papers. • They will attend meetings with colleagues and stakeholders, both within the university and with industrial partners. • They will be required to produce written reports on their work. • The individual will need to make these reports professionally written in English and easy to read without extra support. 	10%
3	<p>Stakeholder liaison</p> <ul style="list-style-type: none"> • The role holder will have to make regular reports to industrial and any academic partners. • They will be responsible for monitoring and communicating project milestones/deliverables. • They will also be expected to explain their work to co-workers within the Centre for Additive Manufacturing research group and occasionally to parties from close collaborators in research groups in other Universities. 	10%
4	<p>Other</p> <ul style="list-style-type: none"> • Researchers within the Centre for Additive Manufacturing are expected to contribute to internal seminar and training activities, by attending and where appropriate presenting. • The role holder will be asked to ensure that they undertake regular continued professional development. • Any other duties as appropriate to this post as requested by the line manager. 	5%

Person specification

	Essential	Desirable
Skills	<ul style="list-style-type: none"> ▪ Excellent oral and written communication skills, including the ability to communicate with clarity on complex information. ▪ Demonstrable skills (in the form of published work and PhD thesis) in advanced processing of refractories (or materials for nuclear applications) ▪ Analytical ability to facilitate conceptual thinking, innovation and creativity. ▪ Effective laboratory note-taking and logging of experiments and data. ▪ Ability for independent research within the context of a team. ▪ Undertake high-quality research and carry out communication and knowledge dissemination activities (which include writing reports writing journal publications, presenting at conferences, and attending networking events) with minimal supervision. 	<ul style="list-style-type: none"> ▪ Ability to prioritise and organise resource requirements (project management skills). ▪ Ability to foster a research culture and commitment to learn in others.
Knowledge and experience	<ul style="list-style-type: none"> ▪ experience in metallurgy and thermo-mechanical characterisation of refractory metals (W or Nb, Ta, Mo, V), or materials for nuclear applications ▪ Experience in microstructural characterisation and thermo-mechanical testing. ▪ Experience in the use of programming software (e.g. Matlab or Python) for both data-processing and the modelling and analysis of engineering systems and components. ▪ Experience with the use of finite element analysis, or other numerical approach to model the thermo-mechanical behaviour of structural metals. ▪ A good understanding of laser and laser processing. 	<ul style="list-style-type: none"> ▪ Experienced in laser powder bed fusion of single or multi-material ▪ Experience in processing dissimilar materials (AM, welding, joining, or other processing techniques). ▪ Experience in manufacturing methods (joining, fabrication, etc.) of refractory metals. ▪ Experience in computer aided design (CAD, SolidWorks, Catia, Autodesk, etc.) ▪ Experience in numerical approaches for optimisation of weight distribution or strength. ▪ Experience in advanced processing of refractories ▪ Experience in modelling thermo-mechanical behaviour of structural metals
Qualifications, certification and training (relevant to role)	<ul style="list-style-type: none"> ▪ An honours degree in Materials or Mechanical Engineering or similar (e.g. Physical Sciences). 	<ul style="list-style-type: none"> ▪ Holds (or studying towards) a PhD in a field closely related to advanced processing of refractories or nuclear materials.

	<ul style="list-style-type: none">▪ Holds (or studying towards) a PhD in Materials or Mechanical Engineering or a related discipline (e.g. Physical Sciences)	
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As part of this, we welcome a diverse population to join our work force and therefore encourage applicants from all communities, particularly those whose protected characteristics under the Equality Act 2010, are not well-presented in our current staff body.



The University is a signatory of the Declaration on Research Assessment (DORA). As such we commit to focus on the scientific content of publications (where requested or provided as part of the recruitment and selection process) as a basis for review of quality, and consideration of value and impact of research conducted, rather than any proxy measures such as Journal Impact Factor.

Expectations and behaviours

The University has developed a clear set of core expectations and behaviours that our people should be demonstrating in their work, and as ambassadors of the University's strategy, vision and values. The following are essential to the role:

- Valuing people** Is friendly, engaging and receptive, putting others at ease. Actively listens to others and goes out of way to ensure people feel valued, developed and supported.
- Taking ownership** Is clear on what needs to be done encouraging others to take ownership. Takes action when required, being mindful of important aspects such as Health & Safety, Equality, Diversity & Inclusion, and other considerations.
- Forward thinking** Drives the development, sharing and implementation of new ideas and improvements to support strategic objectives. Engages others in the improvement process.
- Professional pride** Is professional in approach and style, setting an example to others; strives to demonstrate excellence through development of self, others and effective working practices.
- Always inclusive** Builds effective working relationships, recognising and including the contribution of others; promotes inclusion and inclusive practices within own work area.

Key relationships with others



