

Post Description

Position	Constellium Research Assistant in DC casting of Aluminium Alloys - High Performance Free Machining Alloys	Position no:	12636-1
College / Directorate / Institute	BCAST (Brunel Centre for Advanced Solidification)		
Grade R1	£30,497 - £40,927 per annum plus £2,166 per annum London Weighting		
Contract type	Fixed-Term 36 months		
Full time/Part time	Full-time		
Accountable to	Director of BCAST		
Reports	N/A		
Internal stakeholders	BCAST/STEP programme Director, STEP Programme investigators, STEP programme manager, other STEP programme researchers, other BCAST researchers		
External stakeholders	Constellium UTC R&D, Prototyping and Operational Excellence Teams (Prof. M. Jarrett, Mr. E Beslin, Dr. C. Barbatti)		
Date reviewed	December 2021		

Main accountabilities:

- To conduct and lead the development of Free Machining Aluminium Alloys within Constellium UTC and Brunel University London as part of the strategic Constellium R&D programme.
- To work closely with the Constellium Team to industrialise the emerging science.
- To take part in alloy and extrusion process development programmes within Constellium UTC at Brunel University London.
- To contribute to writing reports and producing deliverables as required for the duration of the programme.
- To disseminate outcomes and results of the project (international journals and conference publications etc.)
- To perform other additional research and scholarly duties in line with University guidelines.
- When necessary, support the work related to industrialisation as well other Constellium Core R&D programmes and projects in partnership with BCAST such as Circular Metals and STEP.

Key duties and responsibilities:

1. BCAST and Constellium under their shared vision on full metal recirculation have work together to realise this goal through understanding the microstructure evolution during liquid metal and downstream processing. As part of the shared vision Constellium is a key industrial partner of BCAST working closely on research in solidification and casting of highly technical aluminium alloys for extrusion.

2. The aim of this post is to develop advanced wrought aluminium alloys for free machining applications (including automotive applications) meeting the required product performance and legislation frame. In addition to proposing alternative element additions to specific aluminium alloy systems, within the scope will be the development of novel DC casting processes and melt treatments for supporting the desired microstructure in the final product as well as generating an in-depth understanding of chip-breaking mechanisms.
3. The specific objectives are:
 - a. To conduct and to lead the development of free machining aluminium alloys meeting the required product performance and the legislation requirements.
 - b. To develop the next generation of aluminium free machining alloys without lead (Pb) additions while keeping high machining performance and excellent surface finish.
 - c. To define with the Constellium Team key performance criteria to be met (such as extrusion speed, number of chips/100g, chip breaking mechanism, compromise strength vs. ductility, anodising conditions).
 - d. Validate proposed novel alloy & processes through selected set of experiments and demonstrate reliable reproducibility of properties and proof of concept.
 - e. Understand machinability mechanisms via state-of-the-art research/ literature review including former internal studies and propose chip breaking mechanism in the context of each alloy system and propose alloy design rules.
 - f. To propose new aluminium alloy systems as a priority in the Al-Mg-Si family but also in the Al-Cu family by extension. The area of investigation will include the use of Fe- and Si-rich particles, elemental additions, dispersoid systems, variation in microstructure (recrystallized, fibrous), homogenisation treatments and ageing conditions.
 - g. To develop both casting & extrusion practices to support the scaling up from laboratory trials to full-scale prototypes within AMCC. Including melt treatment that would support to achieve the selected repartition and size of 2nd phase particles in the billet.
 - h. To demonstrate / validate proposed solution at scale 1:1 using BCAST's DC casting and extrusion lines present in the AMCC building, AMPC & FMC equipment liaising with other industrial R&D centers when necessary (e.g. surface finish).
 - i. To support product transfer and industrialisation in Constellium's extrusion plants including targeted studies and characterisation of materials processed at industrial scale as required.
 - j. To support microstructural investigations in both prototype & industrial billets and extrusions.
 - k. To take part in the alloy and extrusion process development programme within Constellium UTC at Brunel University as part of the strategic Constellium R&D programme.
 - l. To support other core R&D programmes and project in partnership with BCAST such as STEP, Circular Metals, etc.
 - m. To conduct any other research work required by Constellium
 - n. To liaise with Constellium, write journal papers and project reports and present methods and results at project meetings and conferences.
4. The duties include
 - a. Use of microstructural characterisation techniques and mechanical property testing to develop advanced wrought aluminium alloys for free machining applications
 - b. Understand / propose a chip breaking mechanisms in machining operations when not using heavy metal additions.
 - c. Propose alternative minor element additions to aluminium alloys in order to improve their machinability. Target alloy family is Al-Mg-Si, however, Al-Cu alloys are also within the scope of the investigation.
 - d. Work closely with other members of the research team and Constellium engineers to evaluate the impact of novel DC casting processes, melt treatments and extrusion process on free machining alloys / systems proposed.
 - e. Carry out trials at scale 1:1 in both Brunel.

- f. To interact with other researchers and engineers working in BCAST and Constellium and support prototyping activities on AMCC, AMPC and FMC equipment led by the Constellium team and liaise with other industrial R&D centers when required (e.g. surface finish & anodising). Potentially carry out industrial trials at Constellium plants.
- g. Taking initiative in the planning and performance of research.
- h. Maintaining an up-to-date awareness of relevant background literature.
- i. Preparation of high quality research papers for publication in refereed scientific journals and conference proceedings.
- j. Preparation of project progress reports.
- k. Preparation and delivery of presentations at internal seminars and project progress meetings, and at national and international conferences.
- l. Work collaboratively with other members of the research group, including mutual assistance with experimental activities, and with external partners of BCAST

Post Profile

Post-holders will be expected to provide **guidance** to staff and students, **direct** the work of small research teams and have **direct** client/sponsor contact

- Production of independent original research
- Take initiative in the planning of research

1. Communication; Liaison & Networking:

- Give high quality oral and poster presentations on research outcomes at technical meetings/workshops/conferences.
- Acquire the latest research knowledge and to promote BCAST at technical meetings/workshops/conferences.
- Publish high quality papers based on his/her research outcome
- Prepare technical reports for stakeholders
- Support Constellium with industrialisation of emerging science and technology

2. Teamwork and Motivation/Team Development:

- Interact and work with other members of staff in BCAST and Constellium.

3. Analysis & Research:

- Production of independent original research
- Take initiative in the planning of research
- To conduct specific research activities in thermomechanical processing research
- To characterise samples derived from casting and thermomechanical processing experiment
- To provide effective support to other research projects in BCAST

4. Work Environment:

- Complete the health and safety workshop provided by BCAST prior to any research activities
- Comply with the University's health & safety policy

5. Team Development:

- Provide guidance to staff and students and to direct work of small research team including Research Assistants and Technicians
- To participate supervision of junior researchers

Management of Staff and Students (Responsibilities and Accountability)

- Provide guidance to staff and students and to direct work of small research team including Research Assistants and Technicians

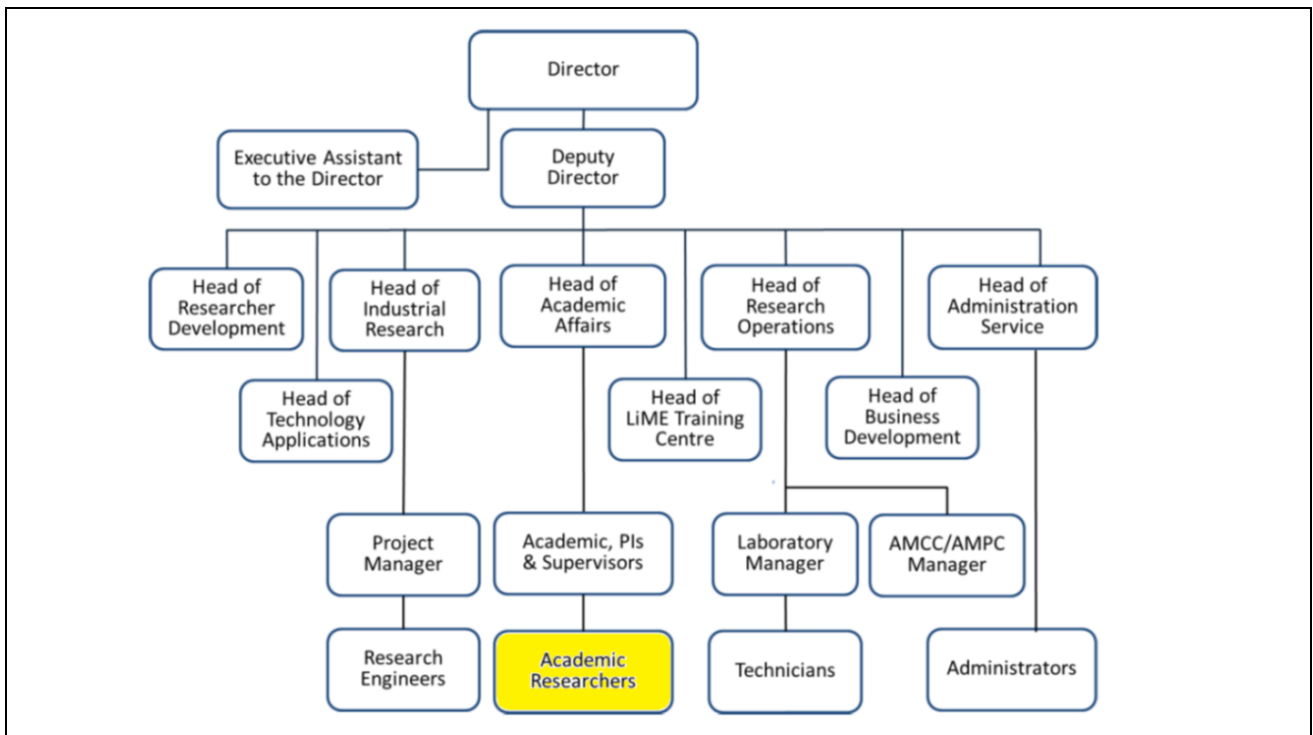
Effective Behaviours

- Timeliness
- Meeting Deadlines
- Communication and Networking
- Networking group across colleges
- Ability to negotiate and influence
- Ability to plan and organise own workload
- Ability to adapt to a flexible approach to the demands of a busy college/department in order to accommodate changes in priorities when required

University Employment Policy:

1. Undertake any other reasonable duties as required and commensurate with the grade of post.
2. Adhere to and comply with the provisions of the Data Protection Act and the Health and Safety at Work Act in accordance with University policies.
3. Undertake all duties and responsibilities in compliance with the rules and regulations encompassing equal opportunities to help foster a diverse workforce.
4. Adhere, comply and work in accordance with University and Departmental policies, procedures and codes of conduct.
5. Promote the University's Environmental Policy and demonstrate commitment to it through actions and decision making.
6. Actively participate in on-going professional development activities as requested

Organisational Chart
The organisational chart comprises of the role, the manager of the role and any direct reports to the role.



Disabled applicants meeting the Essential criterion will be guaranteed an interview as part of the University's commitment to the Disability Confident Scheme.



Person Specification

Attributes	Criteria	Essential /Desirable	How measured
Education, qualifications & training	A degree or equivalent – (appropriate for PhD registration)	E	Application form
Experience	A strong background in physical metallurgy with particular emphasis on light alloys, thermos-mechanical processing and solidification	E	Application form, Interview
	A working knowledge of mechanical testing of metallic materials	E	Application form, Interview
	Experience in experimental solidification & casting research	E	Application form, Interview
	Experience in microstructural characterisation using various microscopy techniques	E	Application form, Interview
	Evidence of IT literacy including Excel and databases.	E	Application form, Interview
	Provide evidence of independent, original research.	E	Application form, Interview
	Experience of organising and supervising a project team	E	Application form, Interview
			E

	Proven experience of planning research, preparing research proposals and negotiating contracts with little supervision.	E	Interview Application form, Interview
Knowledge Skills & Abilities	<p>Good communication skills both verbal and written – particularly when demonstrating the results of own research to both specialists and non-specialists.</p> <p>Ability to draft research papers for Publication in appropriate Academic Journals.</p> <p>Ability to work largely on own initiative with minimum supervision.</p> <p>Ability to give presentations at academic/non-academic conferences and meetings</p>	<p>E</p> <p>E</p> <p>E</p> <p>E</p>	Application form, Interview
Additional Requirements (not included above)			

Job Hazard Assessment

Any identified hazards have undergone appropriate Risk Assessments.

Please tick all relevant workplace hazards identified with this post.				
Currently the University, as a minimum runs Health Surveillance programmes for staff working with skin and respiratory sensitisers, Biological Agents Class 2 and above and GMOs.				
Display screen equipment <input checked="" type="checkbox"/>	Manual handling <input checked="" type="checkbox"/>	Prolonged standing e.g. 1 hour plus <input type="checkbox"/>	Prolonged sitting e.g. 1 hour plus <input type="checkbox"/>	
Biological agents: Class 2 and above and GMO Class 1 <input type="checkbox"/>	Human blood, tissue or fluids <input type="checkbox"/>	Respiratory sensitisers or laboratory allergens e.g. animals <input type="checkbox"/>	Skin Irritants/Chemicals <input checked="" type="checkbox"/>	
Work in confined Places <input type="checkbox"/>	Ionising radiation <input type="checkbox"/>	Noise (more than 80 dba-8 hrs. taw) <input type="checkbox"/>	Lone working <input type="checkbox"/>	
Use of dangerous machinery <input type="checkbox"/>	Electrical hazards <input checked="" type="checkbox"/>	Shift work/night work <input type="checkbox"/>	Work outdoors <input type="checkbox"/>	
Neck & arm vibrating equipment <input type="checkbox"/>	Fork lift truck driving <input type="checkbox"/>	Work at heights <input type="checkbox"/>	Lasers <input type="checkbox"/>	
Any other hazards (e.g. food handling) please specify and ensure that appropriate guidance has been received from the Health & Safety office:				
Physical demands of the job	Lifting <input type="checkbox"/>	Carrying <input type="checkbox"/>	Bending <input type="checkbox"/>	Pushing <input type="checkbox"/>
If lifting/carrying duties expected, please give details of heights/weight load(s) the individual is expected to lift/carry and frequency:				
Travel/Off-site working:	% of time	UK <input type="checkbox"/>	Overseas <input type="checkbox"/>	
Driving for work:	None <input type="checkbox"/>	Occasionally <input type="checkbox"/>	Weekly <input type="checkbox"/>	Daily <input type="checkbox"/>
Management responsibility:	Supervisor <input type="checkbox"/>		Non-supervisory <input checked="" type="checkbox"/>	
Hours of work:	Full time <input checked="" type="checkbox"/>		Part time <input type="checkbox"/> hours	
Non-standard contractual hours? (evenings/weekends) Night work Frequency, number of hours, type of work outside standard hours:				
Other – including occasional or possible work hazards (please specify nature and frequency):				