

Research Associate in Future Gas Turbine Combustion Systems

Job Ref: REQ230202

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

The Rolls-Royce University Technology Centre in Combustion System Aerothermal Processes (UTC) and the National Centre for Combustion and Aerothermal Technology (NCCAT)

The UTC is a strategic partnership between Loughborough University and Rolls-Royce for advanced technology development and associated research. Established in 1991 (6 projects/7 research staff) the group has grown to approximately 55 personnel. The group currently has around 40 experimental and computational (CFD) research projects underway, covering a range of combustion system and gas turbine internal aerodynamic problems.

Building on the success of the UTC group has led to the creation of a new National Centre for Combustion and Aerothermal Technology (NCCAT). Funded through a partnership comprising the Department for Business, Energy and Industrial Strategy (BEIS), the Aerospace Technology Institute (ATI) and Innovate UK, with support from Rolls-Royce and Loughborough University, NCCAT will act as the UK's primary research hub for research and development of future low-emission aero gas turbine combustion technologies, strengthening the UK's ability to benefit from the predicted growth in the civil aerospace market. Beyond aerospace applications NCCAT will also provide wider exploitation potential to clients within the automotive and energy sectors, as well as areas such as power generation, marine propulsion, and thermal management applications.

The Centre will undertake strategic research to develop low emission combustion and aerothermal technology for the UK that is critical to the development of next generation combustion systems. It will also act as a training ground for current and future aerospace engineers in a critical skill area for the UK. In addition, and in conjunction with industrial partners, the Centre will undertake commercial activities that supports the development of hardware for current generation combustion systems. This necessitates the development and application of highly specialised research techniques in bespoke facilities that are used for commercial activities.

Project Description

This project aims to deliver a new experimental capability to support the design and development of future gas turbine combustion system concepts. In the first phase of the project, a new reacting flow test facility will be installed in the laboratory to produce conditions representative of the engine environment being studied. Following successful commissioning of the new test facility, the second phase of the project will focus on the evaluation of new combustion system designs. Measurements of flame geometry, stability/weak extinction and ignition will be needed to understand system performance. The data will be used to develop and test new combustion system concepts that potentially offer improved operability compared to the current state-of-the-art. This project is funded by Rolls-Royce plc and will require close collaboration with industrial partners throughout. Although funded initially for a period of 18 months, the prospects of further funding to continue this work are high.

Eligibility Criteria

Please note that in accordance with the contract agreement for this project, U.S. Citizens, U.S. Nationals, Holders (or previous holders) of a valid U.S. Green Card, or Dual Nationals (where one of those nationalities is that of the U.S.) will not be considered.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

To develop experimental methods for evaluating and understanding the performance of future gas turbine combustion system concepts.

Job Duties

- To perform scientific and technical research using the experimental facilities, instrumentation, data processing and numerical methods used within the UTC and NCCAT.
- To contribute to the design and commissioning of experimental facilities that simulate the important physics associated with gas turbine combustion systems.
- To contribute to the development of measurement systems to enable understanding of the fundamental physical processes associated with combustion system operation.
- To work with University technical staff, external contractors, consultants and specialist equipment manufacturers to enable the manufacture, installation and commissioning of new experimental facilities and measuring equipment.
- To develop ideas for new concepts that offer the potential of improved combustion system performance compared to the current state-of-the-art.
- To carry out experimental measurements and undertake data analysis.
- To develop modelling methods and undertake numerical predictions.
- To collaborate with and support other researchers within the UTC, NCCAT and Rolls-Royce.
- To assist in the training of more junior researchers and research students within the group.
- To write reports, conference and journal papers on research outcomes and make presentations at appropriate workshops, meetings, conferences etc.
- To engage in training programmes in the University (e.g. through Staff Development) and elsewhere as required.
- To perform risk assessments, method statements and implement safety procedures.
- Maintain confidentiality at all times and ensure that intellectual property (IPR) agreements are not violated.
- To undertake such other duties as may reasonably be requested and that are commensurate with the nature and grade of the post.

Points to Note

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

Special Conditions

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures. All staff should hold a duty and commitment to observing the University's Equality & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures. Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

Organisational Responsibility

Person Specification

Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

1 – Application

2 – Interview

Essential Criteria

| Area | Criteria | Stage |
|----------------------|---|-------|
| Experience | Recent relevant research experience in an academic or industrial environment | 1, 2 |
| | Experience in fluid mechanics, heat transfer and/or reacting flows | 1, 2 |
| | Experience of designing experimental facilities | 1, 2 |
| | Experience of operating experimental facilities | 1, 2 |
| | Experience of performing numerical predictions | 1, 2 |
| | Knowledge of various types of fluid mechanic and combustion instrumentation | 1, 2 |
| | Evidence of writing academic papers or equivalent reports | 1, 2 |
| | Experience of coordinating project activities, managing project tasks, prioritising and meeting deadlines | 1, 2 |
| Skills and abilities | Ability to work independently and as part of a team | 1, 2 |
| | Ability to work with external partners (e.g. suppliers, consultants) | |
| | Problem-solving skills, in particular related to experimental methods | 1, 2 |
| | Ability to perform the mechanical design of multi-component assemblies | 1, 2 |
| | Ability to perform hands-on work in the laboratory to set up test geometries, instrumentation etc. | |
| | Excellent oral and written communication skills | 1, 2 |
| | Ability to write project reports and make technical presentations to industrial and academic research groups | 1, 2 |
| | Ability to perform risk assessments in relation to the operation of complex experimental facilities | 1, 2 |
| | Use of data analysis software (e.g. Matlab/C++) | 1, 2 |
| | Use of CFD software (e.g. STARCCM+, COMSOL) | 1, 2 |
| | Write data acquisition and rig control software (e.g. LabVIEW) | 1, 2 |
| | Use of 3D CAD software (e.g. NX) | 1, 2 |
| Training | A willingness to undertake further training as appropriate and to adopt new procedures as and when required | 1, 2 |
| Qualifications | A 2.1 or higher first degree in a relevant engineering discipline, such as aeronautical or mechanical engineering | 1 |
| | A relevant PhD qualification (or near completion) in a relevant subject area | 1 |
| Other | Commitment to observing the University's Equal Opportunities policy at all times. | 1 |

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| | Commitment to maintain confidentiality at all times | 1, 2 |
| | Willingness to travel | 1,2 |

Desirable Criteria

| Area | Criteria | Stage |
|----------------------|---|-------|
| Experience | Knowledge of gas turbine engines | 1, 2 |
| | Knowledge of gas turbine combustion systems | 1, 2 |
| | Experience of test facilities operating with air at elevated pressures and temperatures | 1, 2 |
| | Experience of operating reacting test facilities | 1, 2 |
| | Understanding of relevant H&S regulations/procedures | 1, 2 |
| Skills and abilities | Ability to use reactor network numerical models (e.g. Canterra) | 1, 2 |
| | Ability to use FE software for stressing and thermal analysis | 1, 2 |
| | Experience in helping to formulate research proposals | 1, 2 |

Conditions of Service

The position is full-time and fixed term for a period of 18 months. Salary will be on Specialist and Supporting Academic Grade 6, £32,348 - £42,155 per annum (pay award pending), a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's Terms and Conditions of Employment for staff grades 6 and above, details of which can be found [here](#).

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which can be found [here](#).

The University offers a wide range of employee benefits which can be found [here](#).

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: <http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html>)

In addition, the University is supportive, wherever possible, of flexible working arrangements. We also strive to create a culture that supports equality and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see <http://www.lboro.ac.uk/services/hr/athena-swan/>