

Research Associate in Gas Turbine Performance (16 months)

REQ211306

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.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

Gas-path performance measurements are used in engine development testing as a means of both characterising the engine running condition and assessing turbomachinery component performance. Obtaining accurate measurements is challenging due to the complex engine operating environment, which results in differences between measured quantities and the true flow properties. These differences lead to difficulties in interpreting the engine test data and so hinder the engine development process. Loughborough UTC has developed a unique experimental facility to characterise the performance of gas-path measurement devices under flow conditions matched to those in the engine. This project will use the facility to further improve understanding of the important aerothermal process that affect in-engine temperature measurements, and to quantify their impact. This understanding will feed into the development of new measurement devices and processes that offer improved performance compared to the current state-of-the-art. The project is principally experimental, and some experience of operating experimental facilities is essential. Some complementary modelling work is also expected, and experience with methods for modelling aerodynamic and/or heat transfer problems is required.

The work is funded by Rolls-Royce plc via the ATI CORDITE project and is initially funded for a period of 16 months.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

To develop understanding of the aerothermal process that affect gas-path temperature measurements and to quantify their impact.

Job Duties

- To become familiar with existing experimental facilities and modelling techniques used within the UTC for characterisation of engine gas-path measurement devices.
- To design experiments to simulate the important aerothermal processes in the gas-path of a gas turbine engine.
- To perform experiments and undertake data analysis to quantify the impact of different aerothermal process on gas-path temperature measurements.
- To undertake flow and thermal modelling to simulate the experiments to assist in developing understanding.
- To develop and test new configurations and geometries that offer the potential of improved performance compared to the current state-of-the-art.
- To work closely with University technical staff, external contractors, and specialist equipment manufacturers to implement modifications to the experimental facility.
- To collaborate and work with other researchers within the UTC, NCCAT and at Rolls-Royce.
- To provide guidance and support to external collaborators (e.g. suppliers).
- 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

Reports to Dr Clare Bonham, Lecturer in Gas Turbine Aerothermal Engineering

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 of operating experimental facilities	1, 2
	Experience of applying experimental or numerical methods for the study of aerodynamic and heat transfer problems	1, 2
	Knowledge of turbulence and turbulence modelling	1, 2
	Evidence of writing academic papers or equivalent reports	1, 2
Skills and abilities	Excellent problem-solving skills	1, 2
	Excellent attention to detail	1, 2
	Excellent oral and written communication skills	1, 2
	Ability to coordinate project activities, manage budgets, prioritise tasks and meet agreed deadlines	1, 2
	Ability to perform hands-on work in the laboratory to set up experiments	1,2
	Ability to write project reports and make technical presentations to industrial and academic research groups	1, 2
	Ability to work independently and also as part of a team	1, 2
	Ability to work with external partners (e.g. suppliers, consultants)	
	Skilled in the use of data analysis software (e.g. Matlab/C++)	1, 2
	Familiarity with 3D CAD software (e.g. NX)	1, 2
	Skilled in the use of CFD software (e.g. STAR CCM+)	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 discipline, such as aeronautical or mechanical engineering	1
	A relevant PhD qualification (or near completion) in a relevant subject area or 5+ years equivalent experience in a relevant research or industrial environment.	1
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1

Desirable Criteria

Area	Criteria	Stage
Experience	General knowledge of gas turbine engines	1, 2
	Knowledge of compressible flows	1, 2
	Experience of aerodynamic or heat transfer test facility design	1, 2

	Experience of operating test facilities with air at elevated pressures and temperatures	1, 2
	Experience of advanced optical diagnostic techniques and image processing	1, 2
Skills and abilities	Ability to handle and analyse large data sets	1, 2
	Ability to use commercial FE software for thermal analysis	1, 2
	Ability to perform the mechanical design of multi-component assemblies	1, 2
	Ability to write data acquisition and rig control software (e.g. LabVIEW)	1, 2
	Ability to perform risk assessments in relation to operation of complex and potentially hazardous experimental facilities	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 16 months. Salary will be on Specialist and Supporting Academic Grade 6, £31,406 - £40,927 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/>