## Job Description

### ENGINEERING SCIENCE

<table>
<thead>
<tr>
<th>Job title</th>
<th>Post-doctoral Research Associate in Impact Engineering with Composite Materials for Aerospace Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division</td>
<td>Mathematical, Physical and Life Sciences Division</td>
</tr>
<tr>
<td>Department</td>
<td>Engineering Science</td>
</tr>
<tr>
<td>Location</td>
<td>Impact Engineering Laboratory, University of Oxford Begbroke Science Park</td>
</tr>
<tr>
<td>Grade and salary</td>
<td>Grade 7: £31,076-£38,183 per annum</td>
</tr>
<tr>
<td>Hours</td>
<td>Full time</td>
</tr>
<tr>
<td>Contract type</td>
<td>Fixed-term (1 year in the first instance)</td>
</tr>
<tr>
<td>Reporting to</td>
<td>Professor Nik Petrinic</td>
</tr>
<tr>
<td>Vacancy reference</td>
<td>129569</td>
</tr>
<tr>
<td>Additional information</td>
<td>Reimbursement of relocation costs for postdoctoral positions is only available where allowed on the project.</td>
</tr>
</tbody>
</table>

### For Research posts:

<table>
<thead>
<tr>
<th>Research topic</th>
<th>Impact Engineering with Composite Materials for Aerospace Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Investigator / supervisor</td>
<td>Professor Nik Petrinic</td>
</tr>
<tr>
<td>Project team</td>
<td>Impact Engineering Team</td>
</tr>
<tr>
<td>Project web site</td>
<td><a href="http://www.eng.ox.ac.uk/iel/IET.html">www.eng.ox.ac.uk/iel/IET.html</a></td>
</tr>
<tr>
<td>Funding partner</td>
<td>The funds supporting this research project are provided by Innovate UK</td>
</tr>
<tr>
<td>Recent publications</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### The role

Oxford’s Impact Engineering Team is well known for its ability to design and build bespoke experiments aimed at observation and quantification of rate dependent deformation and failure mechanisms in naturally occurring and man-made materials, as well as to develop analytical and numerical methodology (software) to simulate the experimentally observed and quantified behaviour of materials, systems and structures. This job opportunity has arisen as a result of
the desire to understand the rate dependent response of continuous fibre reinforced polymer matrix composite laminates for aerospace applications.

Responsibilities

Specific duties: Add here anything specific to the project

Key tasks:
- Development of experimental techniques aimed at predictive modelling of the response of composite laminates subjected to impact loading. The major effort will be focused on experimental determination of rate dependent behaviour of composites and related predictive modelling at microscopic length scale.
- Contributing documented experimental methodologies and related software to the team library.
- Involvement in the development of supporting experimental techniques at different length scales for characterisation of deformation and failure in composite materials subjected to impact loading.
- Writing reports and presenting results of research at progress meetings with research partners.
- Writing up the results for conference and journal publications.

Detailed tasks:
- Development of dynamic (hydraulic machine, Split- and Direct-Impact-Hopkinson-Bar, gas gun based) laboratory experiments for characterisation of the response of hygrothermally aged composites to impact loading.
- Contribution to the development of constitutive and cohesive models for simulation of the rate dependent inelastic response of hygrothermally aged composite materials to impact loading.
- Contribution to the development of multi-scale modelling methodology with reliance upon deterministic and stochastic approaches.
- Contribution to the development of algorithms for automation of FE, IGA or mesh-free modelling of laboratory experiments developed during the course of the project.
- Development of experimental methodology for verification and validation of developed modelling methodology.

Additional duties:
- Manage own academic research and administrative activities. This involves small scale project management, to co-ordinate multiple aspects of work to meet deadlines
- Contribute ideas for new research projects
- Develop ideas for generating research income, and present detailed research proposals to senior researchers
- Collaborate in the preparation of scientific reports and journal articles and occasionally present papers and posters
- Act as a source of information and advice to other members of the group on scientific protocols and experimental techniques
- Represent the research group at external meetings/seminars, either with other members of the group or alone
- Carry out collaborative projects with colleagues in partner institutions, and research groups
- The PDRA may have the opportunity to teach or undertake ad-hoc paid teaching (this includes lecturing, demonstrating, small-group teaching, tutoring of undergraduates and graduate students and supervision of masters projects in collaboration with principal investigators). Permission must be sought in advance for each opportunity and the total must not exceed 4 hours a week.
Selection criteria

Essential

- Hold a relevant PhD/DPhil (or be near completion), together with relevant experience
- Possess sufficient specialist knowledge in the discipline to work within established research programmes
- Demonstrable knowledge of experimental methodologies for observation and quantification of mechanical performance of engineering materials (preferably composite materials)
- Familiarity with the Finite Element Method, Iso-Geometric Analysis or Mesh-Free discretisation techniques and the development of Constitutive or Cohesive Modelling algorithms.
- Good computer programming skills, especially in FORTRAN and/or C/C++.
- Ability to manage own academic research and associated activities
- Previous experience of contributing to publications/presentations
- Ability to contribute ideas for new research projects and research income generation
- Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings

Desirable

- Experience of dealing with impact engineering problems
- Expertise in operating mechanical loading equipment from screw driven, hydraulically driven or Split- and Direct-Impact-Hopkinson-Bar, as well as gas guns
- Familiarity or expertise in characterisation of materials at high rates of strain
- Expertise in finite element modelling (e.g. LS-DYNA or ABAQUS/Explicit) of laboratory experiments for development of constitutive and cohesive models.
- Familiarity of expertise in development of constitutive and/or cohesive models for composite materials, preferably continuous fibre reinforced polymers.
- Familiarity or expertise in stochastic modelling of material's response to loading.
- Familiarity with manufacturing processes and experimental characterisation of composite materials for structural design.
- Ability to communicate scientific ideas to an informed lay audience, either orally or in writing. Experience of independently managing a discrete area of a research project
- Experience of actively collaborating in the development of research articles for publication

About the University of Oxford

Welcome to the University of Oxford. We aim to lead the world in research and education for the benefit of society both in the UK and globally. Oxford’s researchers engage with academic, commercial and cultural partners across the world to stimulate high-quality research and enable innovation through a broad range of social, policy and economic impacts.

We believe our strengths lie both in empowering individuals and teams to address fundamental questions of global significance, and in providing all of our staff with a welcoming and inclusive
workplace that supports everyone to develop and do their best work. Recognising that diversity is a great strength, and vital for innovation and creativity, we aspire to build a truly diverse community which values and respects every individual’s unique contribution.

While we have long traditions of scholarship, we are also forward-looking, creative and cutting-edge. Oxford is one of Europe's most entrepreneurial universities. Income from external research contracts in 2014/15 exceeded £522.9m and ranked first in the UK for university spin-outs, with more than 130 spin-off companies created to date. We are also recognised as leaders in support for social enterprise.

Join us and you will find a unique, democratic and international community, a great range of staff benefits and access to a vibrant array of cultural activities in the beautiful city of Oxford.

For more information please visit www.ox.ac.uk/about/organisation

**Engineering Science Department**

Engineering teaching and research takes place at Oxford in a unified Department of Engineering Science whose academic staff are committed to a common engineering foundation as well as to advanced work in their own specialities, which include most branches of the subject. We have especially strong links with computing, materials science and medicine. The Department employs about 90 academic staff (this number includes 13 statutory Professors appointed in the main branches of the discipline, and 25 other professors in the Department); in addition there are 9 Visiting Professors. There is an experienced team of teaching support staff, clerical staff and technicians. The Department has well-equipped laboratories and workshops, which together with offices, lecture theatres, library and other facilities have a net floor area of about 22,000 square metres.

**Teaching**

We aim to admit 160-170 undergraduates per year, all of whom take a 4-year Engineering Science course leading to the MEng degree. The course is accredited at MEng level by the major engineering institutions. The syllabus has a common core extending through the first two years. Specialist options are introduced in the third year, and the fourth year includes further specialist material and a major project.

**Research**

The Department was ranked the top engineering department in the UK, as measured by overall GPA, in the Research Excellence Framework 2014 exercise. We have approximately 350 research students and about 130 Research Fellows and Postdoctoral researchers. Direct funding of research grants and contracts, from a variety of sources, amounts to an annual turnover of approximately £19m in addition to general turnover of about £18m. The research activities of the department fall into seven broad headings, though there is much overlapping in practice: Thermofluids; Materials and Mechanics; Civil and Offshore; Information, Control and Vision; Electrical and Optoelectronic; Chemical and Process; Biomedical Engineering.

For more information please visit:

http://www.eng.ox.ac.uk/

The University of Oxford is a member of the Athena SWAN Charter and holds an institutional Bronze Athena SWAN award. The Department of Engineering Science holds a Departmental Bronze Athena award in recognition of its efforts to introduce organisational and cultural
practices that promote gender equality in SET and create a better working environment for both men and women.

**The Solid Mechanics and Materials Engineering Group**

The group is made up of 13 academic staff, including one statutory Professor. Research is undertaken on the main site in the centre of Oxford and at Begbroke Science Park on the outskirts of the city, which provides over 2100m2 of space for large scale testing facilities. We have 36 postgraduate students and 19 postdoctoral researchers. Research in the group covers a broad spectrum of complementary topics, including: computational mechanics and materials modelling; materials damage and failure (fracture, fatigue, fretting and wear, creep, impact and irradiation); as well as micro- and nano- mechanics. One important long-standing aspect of the group's research has been based around interactions with our primary industrial partner, Rolls-Royce, in the UTC for Solid Mechanics. We are also inaugural members of the Bristol-Oxford Nuclear Research Centre, whose aim is to conduct research to support safe operation of current and future nuclear plants.

We have extensive dynamic loading and materials characterization laboratories, the second of which is equipped with state-of-art apparatus of value £3.4M funded through a major UK government initiative aimed at improving universities’ laboratory infrastructure. In addition, we maintain strong links with the Diamond Light Source and ISIS Spallation Source on the Harwell Campus, through the involvement in the design and commissioning of world-leading engineering instruments such as JEEP and ENGIN-X, and visiting scientist appointments there. Our unique range of capabilities enables us to probe materials across scales, from nano- to macro-. We have recently established the Multi-Beam Laboratory for Engineering Microscopy (MBLEM) which is supported by Oxford Instruments and Tescan, a major international manufacturer of FIB-SEM microscopes. This development complements the already established Laboratory for In situ MicroAnalysis (LIMA). We also have unique servo-hydraulic test equipment designed to explore all forms of contact strength, and world-class expertise and facilities for quantitative high-speed testing and imaging of all types of materials.

The group also actively engages in multi-disciplinary frontier research in fields such as bioengineering and biomaterials, materials physics, microscopy, X-ray, electron imaging and ultra-high-speed digital imaging.

Since 2008, our research income has exceeded £6.3M from Rolls-Royce, £9.8M from EPSRC and the EU, and £5.4M from other sources. We have extensive research activities related to the defence sector and we are further developing our research interests in the power generation sector through collaborations with EDF Energy, Siemens and Mitsubishi Heavy Industries. Along with collaborations and research projects related to other industrial and medical sectors, these activities allow us to maintain a balanced research portfolio. A recent grant of £5.6M from EPSRC has enabled us to extend our research activities to study hydrogen embrittlement in metals.

Further details of the group's research activities may be found on the group website (http://www.eng.ox.ac.uk/solidmech).

**The Impact Engineering Team**

The Impact Engineering Team is the largest segment of the wider Solid Mechanics and Materials Engineering Group and it operates within the Impact Engineering Laboratory at the University of Oxford Begbroke Science Park. The team is comprised of several postdoctoral researchers and a dozen postgraduate students supported by technical, IT and admin support in their quest to observe and quantify rate dependent behaviour of naturally occurring and man-made materials as well as to model predictively such behaviour. Further details of the team’s research activities may be found on the team website (http://www.eng.ox.ac.uk/iel/IET.html)
The Mathematical, Physical, and Life Sciences Division

The Mathematical, Physical, and Life Sciences (MPLS) Division is one of the four academic divisions of the University. In the results of the six-yearly UK-wide assessment of university research, REF2014, the MPLS division received the highest overall grade point average (GPA) and the highest GPA for outputs. We received the highest proportion of 4* outputs, and the highest proportion of 4* activity overall. More than 50 per cent of MPLS activity was assessed as world leading.

The MPLS Division's 10 departments and 3 interdisciplinary units span the full spectrum of the mathematical, computational, physical, engineering and life sciences, and undertake both fundamental research and cutting-edge applied work. Our research addresses major societal and technological challenges and is increasingly focused on key interdisciplinary issues. MPLS is proud to be the home of some of the most creative and innovative scientific thinkers and leaders working in academe. We have a strong tradition of attracting and nurturing the very best early career researchers who regularly secure prestigious fellowships.

We have around 6,000 students and play a major role in training the next generation of leading scientists. Oxford's international reputation for excellence in teaching is reflected in its position at the top of the major league tables and subject assessments.

MPLS is dedicated to bringing the wonder and potential of science to the attention of audiences far beyond the world of academia. We have a strong commitment to supporting public engagement in science through initiatives including the Oxford Sparks portal (http://www.oxfordsparks.net/) and a large variety of outreach activities. We also endeavour to bring the potential of our scientific efforts forward for practical and beneficial application to the real world and our desire is to link our best scientific minds with industry and public policy makers.

For more information about the MPLS division, please visit: http://www.mpls.ox.ac.uk/

How to apply

Before submitting an application, you may find it helpful to read the ‘Tips on applying for a job at the University of Oxford’ document, at www.ox.ac.uk/about/jobs/supportandtechnical/.

If you would like to apply, click on the Apply Now button on the ‘Job Details’ page and follow the on-screen instructions to register as a new user or log-in if you have applied previously. Please provide details of two referees and indicate whether we can contact them now.

You must upload a CV and a supporting statement. The supporting statement should explain how you meet the selection criteria for the post using examples of your skills and experience. This may include experience gained in employment, education, or during career breaks (such as time out to care for dependants). Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description.

Please upload all documents as PDF files with your name and the document type in the filename.

All applications must be received by midday on the closing date stated in the online advertisement.
Information for priority candidates

A priority candidate is a University employee who is seeking redeployment because they have been advised that they are at risk of redundancy, or on grounds of ill-health/disability. Priority candidates are issued with a redeployment letter by their employing departments.

If you are a priority candidate, please ensure that you attach your redeployment letter to your application (or email it to the contact address on the advert if the application form used for the vacancy does not allow attachments)

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk. Further help and support is available from www.ox.ac.uk/about_the_university/jobs/support/. To return to the online application at any stage, please go to: www.recruit.ox.ac.uk.

Please note that you will be notified of the progress of your application by automatic emails from our e-recruitment system. Please check your spam/junk mail regularly to ensure that you receive all emails.

Important information for candidates

Pre-employment screening

Please note that the appointment of the successful candidate will be subject to standard pre-employment screening, as applicable to the post. This will include right-to-work, proof of identity and references. We advise all applicants to read the candidate notes on the University’s pre-employment screening procedures, found at: www.ox.ac.uk/about/jobs/preemploymentscreening/.

The University's policy on retirement

The University operates an employer justified retirement age for all academic and academic-related posts (grade 6 and above), for which the retirement date is the 30 September immediately preceding the 68th birthday. The justification for this is explained at: www.admin.ox.ac.uk/personnel/end/retirement/revisedejra/revaim/.

For existing employees any employment beyond the retirement age is subject to approval through the procedures: www.admin.ox.ac.uk/personnel/end/retirement/revisedejra/revproc/

There is no normal or fixed age at which support staff in posts at grades 1–5 have to retire. Support staff may retire once they reach the minimum pension age stipulated in the Rules of the pension scheme to which they belong.

Equality of Opportunity

Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. No applicant or member of staff shall be discriminated against because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.
Benefits of working at the University

Training and Development
A range of training and development opportunities are available at the University. Further details can be found at www.ox.ac.uk/staff/working_at_oxford/training_development/index.html.

For research staff only: Support for Research Staff
There is a particularly wide range of support for career development for research staff. Please visit www.ox.ac.uk/research/support-researchers to find out more.

Pensions
The University offers generous occupational pension schemes for eligible staff members. Further details can be found at www.admin.ox.ac.uk/finance/epp/pensions/pensionspolicy/.

Information for international staff (or those relocating from another part of the UK)
A wealth of information is available on the University’s International Staff website for staff who are relocating to Oxford from abroad, at www.admin.ox.ac.uk/personnel/staffinfo/international/.

The University of Oxford Newcomers’ Club
The Newcomers’ Club is aimed at helping partners of newly-arrived visiting scholars, graduate students and academic members of the University to settle in and to meet people in Oxford.

Transport schemes
The University offers a range of travel schemes and public transport travel discounts to staff. Full details are available at www.admin.ox.ac.uk/estates/ourservices/travel/.

University Club and University Sports Facilities
The University Club provides social, sporting and hospitality facilities. It incorporates a Club bar, a cafe and sporting facilities, including a gym. See www.club.ox.ac.uk for all further details.

University staff can use the University Sports Centre at discounted rates, and have the chance to join sports clubs. Please visit www.sport.ox.ac.uk/oxford-university-sports-facilities.

Childcare and Childcare Vouchers
The University offers quality childcare provision services at affordable prices to its employees. For full details about the services offered, please visit www.admin.ox.ac.uk/childcare/. NB: Due to the high demand for the University’s nursery places there is a long waiting list.

The University also offers nursery fee payment schemes to eligible staff as an opportunity to save tax and national insurance on childcare costs. Please visit www.admin.ox.ac.uk/childcare.

Disabled staff
The University is committed to supporting members of staff with a disability or long-term health condition and has a dedicated Staff Disability Advisor. Please visit www.admin.ox.ac.uk/eop/disab/staff for further details.

BUPA - Eduhealth
Bupa Eduhealth Essentials private medical insurance offers special rates for University of Oxford staff and their families www.eduhealth.co.uk/mini-site/.

All other benefits
For other benefits, such as free entry to colleges, the Botanic Gardens and staff discounts offered by third party companies, please see www.admin.ox.ac.uk/personnel/staffinfo/benefits/.