

## Job Description and Selection Criteria

<b>Job title</b>	Composite Design Engineer
<b>Division</b>	Mathematical Physical and Life Sciences
<b>Department</b>	Physics
<b>Location</b>	Denys Wilkinson Building
<b>Grade and salary</b>	Grade 8: £45,585 -£54,395 per annum
<b>Hours</b>	Full time
<b>Contract type</b>	Fixed-term for 3 years
<b>Reporting to</b>	Head of Mechanical Engineering
<b>Vacancy reference</b>	168643
<b>Additional information</b>	<p>Closing date – midday on 3 November 2023</p> <p>If following interview, it is evident that there is in-sufficient knowledge or experience of a candidate to achieve the essential and desired criteria an offer of lower grade and so pay scale may be made (Grade 7 £36,024 - £44,263 p.a.) as an underfill until the criteria can be met.</p>

## The role

The successful candidate will design, analyse and arrange for the production of both composite and traditional material components, mechanical moving parts, test rigs and experimental equipment for Physics research. A large portion of the work is in the area of precision instrumentation for experimental Physics, some of which operate within Ultra-High Vacuum (UHV) and Extreme-High Vacuum (XHV) environments. The role requires regular liaison with senior academics, research support staff, workshop technicians, other Universities and large



international research establishments. The ability to develop a concept into something practical, taking 'ownership' of the deliverable and participating in the commissioning of equipment is essential.

The position of Mechanical Design Engineer is within the Mechanical Design Group which is a part of the Oxford Physics Technical Excellence Centre (OPTEC). The OPTEC group is made up of the Mechanical Design Group, Mechanical Workshops, Electronics Engineers Group, Electronics Workshops, Thin Films Unit, Photo Fabrication Facility, Nano Fabrication and the Cryomagnetism Group. OPTEC is charged with the support of teaching and research across the whole department and has impact and interactions with projects and research ranging from large telescope arrays, beamline projects at CERN, space flight instrumentation, fixed target Dark Matter and Neutrino experiments and atomic level projects.

The work of the Mechanical Design Engineer can be very varied and challenging; technological boundaries are being reached and pushed back through the research carried out in the Department of Physics Department and it is in the design phase that much of the advancement in this new technology can be instigated. We are seeking a Mechanical Engineer who has the drive and determination to take an idea from concept to fabricated and commissioned assembly (or instrument), helping Oxford Physics advance the boundaries of science.

## **Responsibilities**

- Use computer aided design systems as required to convert oral and written instructions, draft concept sketches and drawings into workable and practical designs; Drafting of detail, assembly, and general arrangement and production drawings to appropriate design codes and standards.
- Particular emphasis for this post is on the design & analysis of composite components (particularly CFRP), some of which will operate in UHV and XHV environments (no prior knowledge of these environments is required – though would be beneficial).
- Perform fully orthotropic mechanical analysis of composite components including ply orientations, material selections, ply sequencing, cores and inserts.
- Arrange for material testing to ascertain orthotropic material properties where supplier datasheets are too ambiguous.
- Conduct tests of prototype components, assemblies and complete items of equipment (within the vacuum regimes, if required) to demonstrate that they are fit for purpose and conform to requirements. Perform feasibility study and design validation of components using basic design rules, and where the complexity of the component geometry and loading pattern are beyond those covered by these rules, the ability to seek alternative design solutions using FEA (thermal and mechanical stress modelling and tolerancing).
- Design with Departmental facilities in mind for manufacture. Therefore, familiarity with manufacturing techniques, including machining (manual and CNC), spark erosion, sheet metal work, additive manufacture, injection moulding, plating, coatings and surface finishes. Make use of the mechanical and electrical departmental workshops, which provide state-of-the-art fabrication and measurement technologies in house. Provide technical advice to the mechanical workshop.
- Create production drawings for composite components and associated tooling to be manufactured both in house and at external production facilities.

- Write up technical specifications of a designed product or R&D results. Document design trade-offs, prototyping results and detailed analysis (e.g. orthotropic stress etc) as appropriate. Store design information in departmental design data repository.
- Follow mechanical safety best practice procedures to design, manufacture and test equipment prototypes. Obtain and act on verbal feedback from customers / collaborators on task completion. Report any areas of improvement of procedure to the Head of Mechanical Engineering.
- Work at own initiative with the departmental workshops, industry, academics at Oxford and international collaborators. Travel to international meetings and on site at experiment locations as required by the projects.
- Act as internal reviewer for designs and drawings made by others in the Engineering team; be willing to engage with reviews (internal and external) of your work.
- Initiate, maintain and develop strong links to international collaborations, helping develop best practice and guidelines for collaborative projects across a wider consortium.
- Provide advice to Senior Academics, Research Support Staff and International project collaborators on technical issues relating to all aspects of mechanical design and manufacturing engineering.
- As member of the Mechanical Engineers group receive tasks from the Head of Mechanical Engineering and Academic Researchers who are managing a project or project work package. Organise tasks largely independently acting as the Project / System engineer to lead the projects day to day activities from initiation to installation. Provide leadership in tasks involving more junior engineers and technicians.
- Act as the point of contact for all technical aspect of the work in large UK and International projects where there is significant complexity and where extensive interface management is required; managing all related documentation specific to the department and its part in the wider project / collaboration.

## **Selection criteria**

- Hold a degree in Mechanical Engineering or have equivalent experience. In the latter case, two references are required which specifically details the applicant's professional level and explains how these are considered equivalent to the qualification in question.
- Through several significant examples able to demonstrate experience in the design / analysis of precision composite based mechanical components, assemblies or scientific instruments.
- Specialised in the use of a 3-D mechanical CAD design software (preferably Inventor or 3D-AutoCAD) with sound knowledge of mechanical design, established drawing standards, and with a good understanding of the mechanical behaviour of structures (at low temperatures), including the ability to make on-site technical decisions.
- Thorough knowledge and experience of designing for composite materials, including conceptual design, tooling design, orthotropic stress analysis, tooling design, production drawings and material testing.
- Able to report progress and technical detail to collaboration meetings with people from around the world, using presentations and technical reports.
- Have thorough practical knowledge of mechanical manufacturing best practice.

- Is a proven team player and fluent English speaker. Able to discuss specifications, feasibility studies, test results and other technical matters with customers from within, and outside the department.
- Able to manage projects from conceptual design to the manufacturing and final assembly and testing; Have sound knowledge on how aspects of QA/QC could be practised effectively in an academic & research manufacturing environment;
- Have experience and the ability to utilise tools to aid in the management of projects; relating to schedule, cost, risk, change and lessons learnt.
- Have experience in an informal leadership role (guiding junior or graduate engineers for example).
- Be familiar with the behaviour of materials under a combination of static, dynamic, thermal, vibration and seismic loads to ensure that the design meets the functional and safety requirements.
- Working knowledge of FEA (Finite Element Analysis) techniques.
- Able to write technical reports and manuals and contribute to scientific papers.
- Able to travel in order to work with other institutes on projects. Typically for up to one week.

Furthermore, the post holder should have experience in one or ideally more of the following fields:

- Composite material design and manufacture.
- UHV and XHV systems and components.
- Tooling design for composite components

### **Desirable**

- Evidence of leadership of a mechanical system work package in a project.
- Knowledge of composite materials behaviour within UHV and XHV regimes.
- Knowledge of composite materials behaviour at extreme temperatures (cryogenic regimes).
- Able to provide creative solutions and to translate concepts and ideas into practical design.
- Experience working in multidisciplinary teams.
- Willingness to travel to site of an experiment for longer periods (possibly months).
- Trained in the application of standards like ISO9001.
- Willingness to attend training courses to acquire new skills.

## **Pre-employment screening**

### **Standard checks**

If you are offered the post, the offer will be subject to standard pre-employment checks. You will be asked to provide: proof of your right-to-work in the UK; proof of your identity; and (if we haven't done so already) we will contact the referees you have nominated. You will also be asked to complete a health declaration so that you can tell us about any health conditions or disabilities for which you may need us to make appropriate adjustments.

Please read the candidate notes on the University's pre-employment screening procedures at:

<https://www.jobs.ox.ac.uk/pre-employment-checks>

This job is generally office based, requiring DSE assessment. There may be occasions when the post holder will be required to work in a workshop or laboratory and will therefore need to be conversant with the relevant safety procedures and standards operating in that area.

## **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, while providing all our staff with a welcoming and inclusive workplace that enables everyone to develop and do their best work. Recognising that diversity is our strength, 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 and we rank first in the UK for university spin-outs, and in recent years we have spun out 15-20 new companies every year. 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](http://www.ox.ac.uk/about/organisation).

## **Department of Physics**

Oxford Physics is one of the largest and most eminent departments in Europe – pursuing forefront research alongside training the next generation of leaders in Physics.

With an academic staff of over one hundred our activities range from fundamental particles to the furthest reaches of the universe to manipulating matter on an atomic scale. Oxford physicists are probing new ways to harness solar energy, modelling the Earth's atmosphere to predict the future climate, exploring computation on the quantum scale and executing calculations that reveal the fundamental structure of space and time.

## **Sub-department**

The post-holder will be based within Central Physics. This is the central function that supports the six sub-departments that together make up the Department of Physics; these are Astrophysics, Atomic and Laser Physics, Atmospheric, Oceanic and Planetary Physics, Condensed Matter Physics, Particle Physics and Theoretical Physics. Members of all sub-departments take part in research, teaching and matters such as examinations, discussion of syllabi, lectures and liaison with undergraduates and postgraduate students.

For more information please visit: <http://www2.physics.ox.ac.uk/>

## **Mathematical, Physical & Life Sciences Division**

The Mathematical, Physical and Life Sciences (MPLS) Division is one of the four academic divisions of the University of Oxford.

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. We collaborate closely with colleagues in Oxford across the medical sciences, social sciences and humanities, and with other universities, research organisations and industrial partners across the globe in pursuit of innovative research geared to address critical and fundamental scientific questions.

For more information please visit: <http://www.mpls.ox.ac.uk/>

## Athena Swan Charter

The Department of Physics holds a silver Athena Swan award to recognise advancement of gender equality: representation, progression and success for all.

## How to apply

Applications are made through our online recruitment portal. Information about how to apply is available on our Jobs website <https://www.jobs.ox.ac.uk/how-to-apply>.

Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description.

As part of your application you will be asked to provide details of **two** referees and indicate whether we can contact them now.

You will be asked to upload a CV and a supporting statement. The supporting statement must explain how you meet each of 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)

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

All applications must be received by **midday** UK time on the closing date stated in the online advertisement.

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## 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 department(s).

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).

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## If you need help

Application FAQs, including technical troubleshooting advice is available at: <https://staff.web.ox.ac.uk/recruitment-support-faqs>

Non-technical questions about this job should be addressed to the recruiting department directly [recruitment@physics.ox.ac.uk](mailto:recruitment@physics.ox.ac.uk)

To return to the online application at any stage, please go to: [www.recruit.ox.ac.uk](http://www.recruit.ox.ac.uk).

Please note that you will receive an automated email from our online recruitment portal to confirm receipt of your application. **Please check your spam/junk mail** if you do not receive this email.

## Important information for candidates

### Data Privacy

Please note that any personal data submitted to the University as part of the job application process will be processed in accordance with the GDPR and related UK data protection legislation. For further information, please see the University's Privacy Notice for Job Applicants at: <https://compliance.admin.ox.ac.uk/job-applicant-privacy-policy>. The University's Policy on Data Protection is available at: <https://compliance.admin.ox.ac.uk/data-protection-policy>.

### The University's policy on retirement

The University operates an Employer Justified Retirement Age (EJRA) for very senior research posts at **grade RSIV/D35 and clinical equivalents E62 and E82**, which with effect from 1 October 2023 will be 30 September before the 70<sup>th</sup> birthday. The justification for this is explained at: <https://hr.admin.ox.ac.uk/the-ejra>.

For **existing** employees on these grades, any employment beyond the retirement age is subject to approval through the procedures: <https://hr.admin.ox.ac.uk/the-ejra>.

There is no normal or fixed age at which staff in posts at other grades have to retire. Staff at these grades may elect to retire in accordance with the rules of the applicable pension scheme, as may be amended from time to time.

### 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

## Employee benefits

University employees enjoy 38 days' paid holiday, generous pension schemes, travel discounts, and a variety of professional development opportunities. Our range of other employee benefits and discounts also includes free entry to the Botanic Gardens and University colleges, and discounts at University museums. See <https://hr.admin.ox.ac.uk/staff-benefits>

## University Club and sports facilities

Membership of the University Club is free for all University staff. The University Club offers social, sporting, and hospitality facilities. Staff can also use the University Sports Centre on Iffley Road at discounted rates, including a fitness centre, powerlifting room, and swimming pool. See [www.club.ox.ac.uk](http://www.club.ox.ac.uk) and <https://www.sport.ox.ac.uk/>.

## Information for staff new to Oxford

If you are relocating to Oxfordshire from overseas or elsewhere in the UK, the University's Welcome Service website includes practical information about settling in the area, including advice on relocation, accommodation, and local schools. See <https://welcome.ox.ac.uk/>  
There is also a visa loan scheme to cover the costs of UK visa applications for staff and their dependants. See <https://staffimmigration.admin.ox.ac.uk/visa-loan-scheme>

## Family-friendly benefits

With one of the most generous family leave schemes in the Higher Education sector, and a range of flexible working options, Oxford aims to be a family-friendly employer. We also subscribe to the Work+Family Space, a service that provides practical advice and support for employees who have caring responsibilities. The service offers a free telephone advice line, and the ability to book emergency back-up care for children, adult dependents and elderly relatives. See <https://hr.admin.ox.ac.uk/my-family-care>

The University has excellent childcare services, including five University nurseries as well as University-supported places at many other private nurseries.

For full details, including how to apply and the costs, see <https://childcare.admin.ox.ac.uk/>

## Disabled staff

We are committed to supporting members of staff with disabilities or long-term health conditions. For further details, including information about how to make contact, in confidence, with the University's Staff Disability Advisor, see <https://edu.admin.ox.ac.uk/disability-support>

## Staff networks

The University has a number of staff networks including the Oxford Research Staff Society, BME staff network, LGBT+ staff network and a disabled staff network. You can find more information at <https://edu.admin.ox.ac.uk/networks>

## The University of Oxford Newcomers' Club

The University of Oxford Newcomers' Club is an organisation run by volunteers that aims to assist the partners of new staff settle into Oxford, and provides them with an opportunity to meet people and make connections in the local area. See [www.newcomers.ox.ac.uk](http://www.newcomers.ox.ac.uk).