

Wolfson School of Mechanical, Electrical and Manufacturing Engineering

Encocam Ltd.

JOB TITLE: Biomechanics Test Device Innovation Engineer (KTP Associate)

Job Ref: REQ230647

Period: 30 months

Salary: £32,000 - £36,000 per annum (Confirmation on offer of appointment) plus £5,000 (£2,000 per annum) training budget

Application deadline: 18th June 2023

Key words: mechanical engineering, manufacturing engineering, CAD, finite element analysis, material characterisation, laboratory impact testing, stakeholder engagement,

Due to funding, this project must start on or before 16th September 2023

Project Title: Human neck anthropomorphic test device commercial development and modelling

The Opportunity

Encocam Ltd. (Cellbond ATD) have partnered with the Wolfson School of Mechanical, Electrical and Manufacturing Engineering Sports Technology Institute to develop a commercially manufactured anthropomorphic test device (ATD) neck and validated finite element (FE) model based on component and full-scale experiments. The ATD neck and accompanying FE model will exploit intellectual property generated from cutting-edge research at Loughborough University's Sports Technology Institute to upgrade industry standards in safety testing for a range of a industry sectors (e.g., sports, automotive, military and security service protective equipment).

With over 30-years' experience in design development, precision manufacturing of safety products and industry testing, Encocam are currently one of the top 5 crash test dummy manufacturers globally. They provide engineering services to the UK, European, Japanese, Chinese and US markets whilst continuously innovating to improve their product offering. For decades, crash test dummies or ATDs have been used in safety analysis providing measurable, repeatable, and reproducible safety testing for injury prevention. Impact simulations give measurable indications of the performance of protective equipment for the improved safety of human occupants, users or pedestrians. Market entry for new products can be hampered by the regulatory framework, particularly for the automotive industry, creating a barrier to entry and burden of proof on manufacturers to demonstrate alignment with current industry standards and the potential benefits of proposed standards innovation. Through their network of business contacts and membership of industry consortia Encocam are global thought leaders in this important sector.

Loughborough University is ranked in the top ten of the most recent Complete University Guide Guardian League Table and the Times Good University Guide. It has been awarded a record of seven Queen's

Anniversary Prizes for its research impact on society and UK industry. The 2021 Research Excellence Framework recognised excellence in Loughborough University's outputs, impacts and environmental contributions with over 90% of Loughborough's research classed as world leading or internationally excellent (REF 2021).

The world-leading Sports Technology Research Group was established to have a positive global, social and economic impact on sport through excellent engineering research, teaching and enterprise. The Group has an international reputation for its work with global brands and federations including adidas, PING, Head, FIFA, Watbike, England & Wales Cricket Board, FA, FIH, New Balance, Nike, UK Sport, Reebok, Speedo and Umbro on the design, simulation, testing and manufacture of sporting goods. It is based in the University's £15 million Sports Technology Institute, which boasts a range of state-of-the-art equipment and bespoke test rigs. Their award-winning sports impact injury research is widely recognised as world leading.

At the Sports Technology Institute around 50 academics, research associates, technicians and PhD students carry out wide-ranging research including athletic footwear, technical apparel, protective equipment, balls, bats, clubs, rackets and fitness equipment. Our track record of design-led innovation and accelerating novel concepts from initial stages through to commercialisation is unparalleled. As a research hub, the Sports Technology Institute benefits from established relationships with the University's sports scientists, psychologists, biomechanists and human biologists. Our researchers have extensive experience of testing with numerous elite athletes and professional sportsmen and women spanning the most diverse array of sports.

The Institute houses state-of-the-art equipment and bespoke test rigs. The Group has invested consistently in infrastructure, supported by grants from the Engineering and Physical Sciences Research Council and the East Midlands Development Agency (EMDA).

The KTP Associate will have access to a wide range of commercial, R&D and management training programmes, utilising a generous £5,000 personal training budget, as well as support, and access to resources and facilities at Loughborough University.

Your Future Role

This position provides the successful candidate with a rare opportunity to transform their career and so become a global safety pioneer. Working for an academic institution and company with established international reputations for excellence in their fields, you will:

- become a leading expert in design, analysis, manufacture and test of revolutionary ATD technologies
- by creatively utilising cutting-edge manufacturing and simulation facilities deliver these in the form of commercially viable test devices and computational models for the automotive, defence and sports industry sectors, gathering feedback for product improvement
- contribute to future industry standards for impact safety testing readying the marketplace for the expected exponential growth in the autonomous vehicles and addressing recent concerns over the consequences of upper body sports impact injuries

- communicate your project successes to a growing network of global industry contacts to revolutionise protective equipment testing
- establish your own international reputation for critical insight and expertise
- assimilate ideas and expertise from global thought leaders and stakeholders

Delivering urgently needed technologies for novel and emerging safety testing requirements will transform global equipment safety assurance, testing compliance and injury prevention in these market sectors whilst inspiring similar beneficial change in others.

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.

Job Description

Job Grade: Other (6 equivalent)

Job Purpose

The KTP Associate will:

- Scope the requirements of Encocam's senior leaders, advisory panel members and global commercial stakeholders.
- Determine the expectations of knowledge base team, draw on opportunities presented by influencers, sports industry bodies, policy makers and future customers who will access the early prototypes for testing and feedback.
- Organise focussed stakeholder interviews, workshops for determined tasks and 6-monthly meetings between Encocam, Loughborough University and the advisory panel to facilitate stakeholder engagement
- Engage with external sport and automotive stakeholders to translate early feedback from the prototype to engineering design modifications for the commercial product.

TECHNICAL:

- Acquire detailed familiarity with the research ATD and intellectual property (including: underlying principles, engineering design decisions (geometry, materials, tolerances, functionality), design embodiment) to understand the scope for alteration/improvement whilst maintaining performance targets.
- Develop neck ATD manufacturing processes working within Encocam's facilities generating expertise in the methods, facilities and procedures.
- Conduct finite element analysis (FEA) modelling for optimisation of ATD component material characteristics (e.g., stiffness) to simulate bending and stiffness responses within the current regulatory response corridors that are key for acceptance in the automotive sector.
- Develop a complimentary, commercial grade, FEA model of the ATD for sale by Encocam.
- Validate the FEA model through comparison with their physical neck impact testing.
- Revise the existing neck ATD design to achieve a commercial prototype, aligned with stakeholder performance criteria compliant with regulatory specifications at feasible production cost.

DATA ANALYTICS:

- Conduct industry standard performance characterisation tests on prototypes and subsequent revisions, utilising Encocam's and LU's test facilities. Statistical analyses will be used to compare response corridors with current industry standards.
- Assess performance under compliance against the industry standards assessing repeatability and shelf life.

Job Duties

- Carry out the KTP project tasks and deliver the outcomes as outlined in the project plan
- Undertake KTP management training, as well as other courses as deemed necessary
- Write R&D reports, and present these at the Local Management Committee (LMC) meetings, as well as at national conferences and symposia with other members of the project team
- Prepare research papers for publication in highly acclaimed learned journals, in line with the expected scholarly activities of the University Research Staff, but in accordance with the commercial sensitivity of collaborating companies
- Travel to Company clientele when required and to various other locations within the UK, and possibly overseas, as required
- To undertake such other duties as may be reasonably 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 the KTP Lead Academic: Dr. Sean Mitchell (S.R.Mitchell@lboro.ac.uk).

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 – Test/Assessment Centre/Presentation
- 3 – Interview

Essential Criteria

Area	Criteria	Stage
Experience	Experience in the design, predictive analysis, optimisation, manufacture, calibration and testing of mechanical devices	1,2,3
	Experience in the selection of engineering materials to achieve component strength, stiffness, wear and durability design goals	1,2,3
	Experience in the processing of engineering materials to achieve component tolerance, surface finish, quality and manufacturing cost design goals	1,2,3
	Experience in component and assembly quality control methods	1,2,3
Skills and abilities	Proficient in the use of industrial grade CAD software (e.g. NX, Solidworks, or equivalent)	1,2,3
	Proficient in the use of industrial grade FEA software (e.g. LS Dyna, Abaqus, NASTRAN, ANSYS)	1,2,3
	Proficient use of MS Word, Excel, PowerPoint, Teams.	1,2
	Proficient in the use of statistical methods to analyse experimental data	1,2
	Ability to take initiative and to work as part of a team	1,2,3
	Able to think independently, challenge ideas and develop innovative solutions.	1,2,3
	Demonstrates accuracy, attention to detail and high levels of presentation quality.	1,2,3
	Excellent communication skills with a high standard of spoken and written English.	1,2,3
	Excellent technical writing skills	1,2,3
	Demonstrable experience of confident and collaborative communication with clients and/or stakeholders to achieve common aims	1,2,3
Training	Motivated to undertake KTP training modules and bespoke training as appropriate for personal and professional development	3
Qualifications	Masters level qualification in mechanical, automotive, manufacturing or closely aligned engineering discipline or Bachelors level with appropriate research and development experience.	1
Other	To always observe the University Equal Opportunities policies	3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience in the design, predictive analysis, manufacture, calibration and testing of ATDs for impact testing	1,2,3
	Experience in the commercial moulding of elastomeric materials to produce flexible components	1,2,3
	Experience in component and assembled product impact testing and calibration in a laboratory context	1,2,3
	Experience in the design and development of static and dynamic testing and calibration systems	1,2,3
	Familiarity with impact test standards in a relevant industrial context	1,2,3
	Demonstrable leadership experience of resolving technical challenges within an industrial team	1,2,3
	Proven track-record of engaging diverse stakeholders in a change programme	1,2,3
	Experience managing project budgets	1,2,3
	Experience presenting project outcomes in an international forum verbally and in written form	1,2,3
Skills and abilities	Proficient in the use of industrial grade CAD/CAM software	1,2,3
	Proficient in the use of LS Dyna for both static and dynamic loading of hyperelastic models	1,2,3
	Proficient in the use of Hypermesh	1,2,3
	Proficient in the use of rigid body mechanism analysis software	1,2,3
	Proficiency in the use of MATLAB	1
Qualifications	Graduate in post-graduate research (PhD).	1,3

Conditions of Service

The position is FULL TIME and FIXED TERM. Salary will be £32,000 - £36,000 per annum, at a starting salary to be confirmed on offer of appointment, plus £2,000 per annum training budget.

The appointment will be subject to the University's normal Terms and Conditions of Employment for Academic and Related staff/Operational and Administrative staff, 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 are available at <http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html>.

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/>