

Research Associate – Validation of Torsional Vibration Absorber Technology for the Next Generation of Drivelines

Job Ref: REQ240228

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Project Description

Approximately 75% of transport emissions occur at the tailpipe. New technologies, such as electric machines, hydrogen-fuelled engines, and hybrid electric drives, are developed in response to new legislations, directives and environmental concerns. Tailpipe emissions can be reduced through downsized, lightweight powertrains. However, new vibration and durability challenges can adversely affect performance of vehicles. Torsional vibrations can lead to potential mechanical failures of shafts and couplings, reducing the useful life span of the system. Damping devices, such as flywheels, are commonly used to mitigate excessive vibrations with the drawback of increased inertia. Current systems therefore have issues that have compromised their optimal adoption into drivetrains.

The goal of this project is to develop novel solutions to mitigate against torsional vibrations more effectively for the next generation of powertrains, and to overcome the issues associated with existing damping devices. These new solutions will utilise a combination of conventional solutions and concept of nonlinear energy absorption. These potential solutions will improve durability of the coupling and driveline whilst reducing the overall weight of the powertrain. The project is in collaboration with Gibson Technology Ltd (GT) and the output can potentially be adapted for various applications (e.g., automotive powertrains).

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

To utilise concepts of nonlinear dynamics and nonlinear energy absorption and develop tools for analysis of novel coupling designs for powertrain applications. As part of this role, candidate is also expected to develop a prototype of the unit and carry out a series of laboratory tests at Loughborough University as well as system level tests in the company's premises. Through this project, the intention is to de-risk the technical adoption of the developed technology through integrating it into the design of industrial partners' product. In essence, project will enable the team to test the efficiency and performance of this novel solution in reducing vibrations.

Job Duties

- Assessment of available solutions in the market and the current design in industrial partner's premises.
- Development of new approaches to designing, analysing and deploying vibration absorbers in powertrain designs for performance analysis and optimised products.
- Manufacturing and assessment of a technology prototype tuned to the industrial partner's application/product through a combined simulation and experimental approach.
- Liaise with industrial and academic partners and travel to other locations across UK to carry out experiments at the sites of the industrial partner.
- Analyse experimental and modelling results and prepare reports and presentations for dissemination at project meetings.
- Maintain confidentiality of results and other confidential information.

- Comply with University Health and Safety Policy and with all University Rules and Regulations.
- Willingness to undertake 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 Dr N Dolatabadi, Principal Investigators.

Person Specification

Your application will be reviewed with respect to meeting the essential and desirable criteria listed below. 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	Design, Implementation and Evaluation of multibody dynamics systems for automotive powertrains	1,3
	Experience of techniques (e.g., multibody dynamics analysis, nonlinear dynamics analysis) to study and classify vibration absorber designs. Knowledge of current best practices	1,2,3
	Experience of commercial software packages for modelling and analysis, assessments using state of the art tools and services (including e.g., MSC ADAMS, MATLAB)	1,3
	Experience of design, implementation and evaluation of powertrain components	1,2,3
	Experience of laboratory	
	Experience of and willingness to undertake secondments in a range of industrial stakeholder applications	1,3
	Ability to work accurately and precisely and to record information gathered	3
Skills and abilities	Ability to undertake multibody dynamics modelling, perform design cycle iterations, optimisation and visualisation (e.g., Matlab, MSC ADAMS)	1,3
	Self-motivated and able to work without close supervision	3
	Ability to work to deadlines	3
	Good report writing and presentation skills	1,2,3
	Demonstrated ability to work independently and as part of a team	3
	Ability to maintain confidentiality at all times	3
Qualifications	Good First Degree in Engineering, Physics, Mathematics, Computer Science (1 st Class or Upper 2(i))	1,3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience of conducting laboratory tests, working with experimental protocols and measured data handling and postprocessing	1,3
	Signal processing skills with the focus on powertrain applications and experimental data	1,3
	Modelling, optimisation and knowledge of nonlinear dynamics problems within academia and/or industry	1,3

Skills and abilities	Evidence of working with and presenting to company directors / senior managers, supervisors, operators within industry	1,2,3
	Ethical and risk assessment trained	1,3
Qualifications	Ph.D. completed (or about to complete) in relevant areas to mechanical engineering with focus on dynamics of powertrain applications and systems for next generation of vibration absorbers	1,3
	Able to travel independently	1,3

Conditions of Service

The position is FULL TIME and FIXED TERM for 11 MONTHS. Salary will be on Specialist and Supporting Academic Grade 6, £33,966 - £44,263 per annum, depending on the candidate's experience at the time of appointment. The post holder must be in post by 1 June 2024.

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/>