



UNIVERSITY of LIMERICK
Ollscoil Luimnigh



TITLE OF POST: Marie Curie Early Stage Researcher (x2)

LOCATION: University of Limerick

REPORTS TO: Project Leaders

CONTRACT TYPE: Specific Purpose

SALARY: €37,903 p.a. (plus family allowance of €4,589 p.a. where appropriate in accordance with Marie Skłodowska-Curie programme rules).

JOB DESCRIPTION

QUALIFICATIONS:

MEng 2.1 Hons (minimum) degree (or equivalent) or BEng (Hons) 1st Class Hons degree from 4-year BEng programme (or equivalent), in Mechanical/Aerospace Engineering or closely related discipline.

The candidate must be — at the date of recruitment — an 'early stage researcher (ESR)', i.e. in the first 4 years (full-time equivalent) of his/her research career and may not have acquired a doctoral degree. The four years are measured from the date when they obtained the degree which would formally entitle them to embark on a doctorate, either in the country which the degree was obtained or in the country in which the research training is provided.

International mobility: The applicant should not have resided in the Republic of Ireland for more than 12 months in the 3 years immediately prior to the recruitment date and not have carried out their main activity (work, studies, etc.) in that country.

The candidate must be able to demonstrate English proficiency (in speaking and writing) as the communication and teaching language throughout **ICONIC** is English (e.g. TOEFL or similar English language certificates).

OVERALL PURPOSE OF THE JOB:

- To undertake one of the two research projects (ESR 1 and ESR2 – see below), offered at the University of Limerick, leading to the award of a PhD. These two projects form part of a Marie Skłodowska-Curie European Training Network (**ICONIC** - Improving the crashworthiness of composite transportation structures).
- To participate in training programmes, workshops, summer schools and conferences. To complement the training programme through secondments with other consortium members and disseminate research outcomes through conference presentations, journal papers and other means as appropriate.

DESCRIPTION:

The **ICONIC** network consists of nine beneficiaries spread across six countries. It is led by the Queens University of Belfast, and partners include the University of Limerick, Bombardier, Centro Recherche Fiat, the DLR, Swerea SICOMP AB, Dassault Systemes UK, Augusta Westland, and Salamander Amphibious Vehicles. **ICONIC** will appoint a total of fifteen Early Stage Researchers (ESRs) who will each pursue a three-year PhD programme in an innovative, multidisciplinary and inter-sectoral, structured research and training programme. These ESRs will acquire the skills to enable the sustainable and economically-viable design of a new generation of highly-efficient, lightweight transportation composite structures that will provide the maximum protection to occupants and pedestrians, through superior crashworthiness. All ESRs will spend up to three months on secondment at other participating member organisations and will be expected to attend a series of workshops, training courses, and summer schools, and present at the international **ICONIC** conference towards the end of the research programme.



Two ESRs are based at the University of Limerick, as described below. **Candidates should indicate whether they are interested in one or both of the projects, and if both, should rank the projects in order of preference.**

ESR 1: Optimisation of mechanically-fastened composite joints for energy absorption

This project aims to extend an existing computational tool for the high fidelity modelling of mechanically-fastened, composite joint failure, to account for dynamic effects, and develop a framework to optimise complex, multi-fastener, composite joints for energy absorption, via numerical simulation. The response of mechanically-fastened joints in large composite components, during a high energy impact damage event (e.g. bird strike or crash scenario), has a significant influence on the overall energy-absorbing characteristics of the structure. This project will build on extensive modelling work at UL to develop a predictive computational tool for assessing the energy-absorbing characteristics of joints under dynamic loading. It will also involve high-speed tensile testing of composite bolted joints, and composite materials, to assist in validating the developed computational tools.

ESR 2: Development of discrete fastener-less joining technologies for impact protection devices

This project aims to develop a novel interlocking and fastener-less joining technology for composite-to-metal joining, and optimise the interlock design for maximum energy absorption. The use of both composites and metals in transportation structures is ubiquitous, and these dissimilar materials are typically joined using mechanical fasteners when high loading needs to be transferred. This project builds upon the research strengths at the University of Limerick in the design and analysis of mechanically- fastened composite joints and will lead to a novel fastener-less interlocking joint designs for composite-to-metal joints. New fully reversible adhesives, that can be reverse-activated by high frequency electromagnetic waves, will be utilised to bond and seal these interlocked surfaces. An optimisation exercise will be undertaken to optimise these joints for energy absorption

Main activities/responsibilities (both ESRs)

- Perform the research required to achieve the project goals and satisfy the criteria for achieving a PhD.
- Work both independently and in collaboration with other ESRs to realise **ICONIC**'s overall project's aims and objectives.
- Refine the research programme for ESR project with the assistance of supervisors.
- Undertake planned secondments at partner sites.
- Actively participate in PhD training programmes.

Research Management (both ESRs)

- Maintain an updated Personal Career Development Plan (PCDP).
- Produce regular reports to various stakeholders as required.
- Participate in the ESR Council.
- Assist in the planning and organisation of summer schools, workshops, international conferences and outreach activities.
- Act as a Marie Skłodowska-Curie Ambassador and visit schools to foster interest in STEM subjects.
- Contribute to social media to promote the work of **ICONIC**. Manage own workload to ensure that milestone and deliverables are met.

Research Outputs - Write Up and Dissemination (both ESRs)

- Present results at appropriate conferences
- Write journal papers on the results of the research
- Contribute to newsletter/websites or other dissemination fora



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O L L S C O I L L U I M N I G H



Essential Criteria (both ESRs)

- M Eng 2.1 Hons (minimum) degree (or equivalent) or B Eng (Hons) 1st Class Hons degree from 4-year B Eng programme (or equivalent), in Mechanical/Aerospace Engineering or closely related discipline.
- Satisfies Marie Skłodowska-Curie actions definition of ESR and complies with mobility rule.
- Strong background in Solid Mechanics and Finite Element Analysis.
- Excellent mathematical ability and strong analytical and problem-solving skills.
- Significant computer programming experience.
- A basic knowledge of fibre-reinforced composite materials.
- Demonstrable interest in the subject.
- Strong verbal and written communication skills in English.
- Ability to communicate complex information clearly.
- Ability to work independently and as part of a team, with good interpersonal skills.
- Willingness to contribute to the School and Project outreach activities.
- Ability to manage time and meet deadlines.
- Willing and able to undertake placements at partner organisations.
- Willing and able to travel to programme meetings and present at conferences.

Desirable Criteria (both ESRs)

- Evidence of a major undergraduate research project in a related area.
- Evidence of experience with programming user-defined subroutines in Finite Element codes.
- Evidence of experience in mechanical testing of composites.

