



TRUSS
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TRUSS (Training in Reducing Uncertainty in Structural Safety) is a Marie Skłodowska-Curie Innovative Training Network funded by the European Union under the Horizon 2020 Programme. TRUSS is structured into taught modules combined with original and impactful research supported by secondments that will give the successful candidates significant insights and exposure to research and innovation in both academia and industry.

EARLY STAGE RESEARCHER VACANCY:

ESR 6



Project Title:

RESIDUAL LIFE ASSESSMENT AND MANAGEMENT OF SHIP UNLOADERS

Host

Lloyd's Register EMEA

Address

Technical Investigation Department; Lloyd's Register Global Technology Centre;
Southampton Boldrewood Innovation Campus; Burgess Road, Southampton SO16 7QF

Country

United Kingdom

Main Supervisor

Dr. Kian Banisoleiman

Background

Ship unloaders are a vital element of the infrastructure in the transport chain of containers, coal, iron ore and other bulk materials. They are subject to relatively rapid rates of deterioration due to environmental factors and mechanisms such as corrosion, physical and chemical attack, bio-deterioration, as well as general wear, abrasion, fatigue and accidental damage. Inspection, maintenance and repairs typically become more costly and impact more severely on operational availability towards the end of ship unloaders' lives. The two main concerns towards the end of life are typically corrosion and fatigue. Through in-depth measurements and advanced analysis it is possible to develop the required knowledge to allow important decisions regarding the future of the unloaders to be made on a sound and rational basis, taking into account operational, safety and maintenance requirements and costs. Such structural residual life assessments are currently typically undertaken at five yearly intervals towards the end of the assets' lives. Taking a snapshot of the condition of the unloaders allows identifying the operational loading and the environmental conditions. Extrapolating these snapshots into the past and future is of course open to many uncertainties and conservative estimates are made. One of the aims of TRUSS is to reduce



these uncertainties, reduce the risk of continued operation, and reduce costs of maintenance and inspection for the ship unloader owners and operators. Access to a 50+ channel long term monitoring system on a ship unloader installed by *Lloyd's Register* will be available to the ESR. It is anticipated that further opportunities to participate in the further development and installation of such systems will be made available over the course of the project. The ESR will analyse collected data from strain, vibration and temperature as a minimum and will investigate the use of other technologies. The monitoring system will be developed to autonomously execute fatigue and fracture mechanics calculations based on the measurements and a FE model built in collaboration with *UCD* to reconcile with the real behaviour of the structure.

Objectives

Measured data will be processed in real time and produce an automated report showing the fatigue usage of each critical joint compared to the design and mean fatigue lives defined in international standards on a probabilistic basis. By integrating this with measurements of corrosion rates of the unloader, the owner will be able to undertake simple, accurate and automated ongoing monitoring of the residual life of critical structural elements based on actual usage. This will allow maintenance and inspections to be planned on a condition basis and maximise operational availability. The research will additionally examine design criteria and the effect of environmental conditions and operational variability that affect the lives of ship unloaders. It is expected that the results will lead to a reduction in risk and cost in maintaining and operating ship unloaders which will enhance the sustainability and robustness of this vital link in the transport infrastructure chain.

Expected Results

Long term autonomous monitoring systems customised to ship unloaders that will ensure their safe operation.

Secondment

This position involves a secondment of some months to University College Dublin (*UCD*). The ESR will reconcile a FE model of the ship unloader with measurements. Changes in frequencies as a result of damage will be investigated.

Specific Requirements

- At the date of closure of appointments, candidates must have obtained, or finalize within 3 months, a 4-yr Bachelor or a Masters degree in Engineering, with a strong background in Structures.
- Prior knowledge and skills in programming are desirable but not mandatory.
- We are looking for candidates with a strong motivation to pursue a career in engineering and an open mind for new approaches and a lot of team spirit. Creativity and level of independence will be considered.
- Solid written and oral communication skills in English are prerequisites of any successful application.

Eligibility Criteria



- Researchers can be of any nationality and age.
- All recruited researchers **must be Early-Stage Researchers (ESRs)**. A ESR shall, at the time of recruitment by the host organisation, **be in the first four years of their research careers** and not yet have been awarded a doctoral degree. The four years start to count **from the date when a researcher obtained the degree which would formally entitle him/her to embark on a doctorate**.
- Researchers are required to undertake transnational **mobility** (i.e. move from one country to another) when taking up their appointment. One general rule applies to the appointment of researchers: **At the time of recruitment by the host beneficiary, researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of their host beneficiary for more than 12 months in the 3 years immediately prior to the reference date. Note that the *mobility* rule applies to the beneficiary where the researcher is recruited, and not to beneficiaries to which the researcher is sent or seconded.**
- For all recruitments, the eligibility and mobility of the researcher will be determined at the time of their (first) recruitment in the project. The status of the researcher will not evolve over the life-time of a contract.

Salary and Working Conditions

- Each position is for a period of 36 months. These positions will be available from August/September, 2015. The Marie Skłodowska-Curie programme offers highly competitive and attractive salary and working conditions. Exact salary will be confirmed upon appointment. It consists of a living allowance (= 37320 euro/year [the Marie Skłodowska-Curie rules apply a correction factor to this amount to allow for the cost of living in different countries]) + a monthly mobility allowance (= 600 to 1100 euro/month depending on the family situation).
- Furthermore, PhD tuition fees for the ESR are covered and the research project is aimed at defending a thesis and obtaining a PhD degree. In addition to their individual scientific projects, all positions will benefit from further continuing training, which includes internships and secondments (All ESRs will be seconded at least once during this period at another partner site), a variety of training modules as well as transferable skills courses, active participation in workshops and conferences, and exposure to large enterprises, SMEs and Universities from different European countries involved in TRUSS.

Application Procedure

- (1) Check you meet **Eligibility criteria** and **Specific requirements for the ESR position** project/s you are applying for.
- (2) Prepare the following **application documents** (in English):
 - a. **A curriculum vitae**, including contact details, education (at University level and other), work experience, prizes/awards, language skills, etc... (max. 2 pages). The CV should reflect a representative array of achievements and qualifications appropriate to the post for which application is being made.



- b. **Official academic record** of undertaken courses & grades for Bachelor (and Master if required in specific criteria) degree.
 - c. **A motivational letter** in which the applicant describes his or her motivation to pursue postgraduate studies and to conduct the research project/s applied for. Mention the ESR project number or numbers (in the latter indicate order of preference if any) on your motivational letter and the subject of the email.
 - d. **A reference letter.**
- (3) Email your application documents as attached files to: trussitn@ucd.ie **before the 1st May 2015 deadline** and mention the ESR project number/s you are applying for in the subject line.
- (4) The documents provided will be used to select the best candidates. Successful candidates will be informed **before 29th May 2015**.

For more information on a position with TRUSS, please check
www.trussitn.eu/vacancies or email trussitn@ucd.ie