



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 2



Project Title:
**REDUCTION OF UNCERTAINTY
IN ASSESSING CONCRETE
STRENGTH OF EXISTING
STRUCTURES**

Host

Ove Arup & Partners Ireland Ltd

Address

Building Engineering; 50 Ringsend Road, Dublin 4

Country

Ireland

Main Supervisor

Dr. Salam Al-Sabah

Background

In 2013, the 8-storey Savar building in Dhaka-Bangladesh disasterous collapsed resulting in a death toll of more than 1100. This resulted in the deadliest garment-factory accident in history, as well as the deadliest accidental structural failure in modern human history. Following the collapse, the “Accord on Fire and Building Safety in Bangladesh” was established to maintain minimum safety standards in the Bangladesh textile industry. Nearly 1600 factories were covered by the Accord, representing around one third of the Bangladeshi textile industry. As part of the Accord, Arup was commissioned to carry out structural inspection on the factory buildings. The structural assessment of existing buildings require the availability of information regarding the general arrangement of the structural elements and their dimensions. In addition, information about the loads applied to different parts of the building need to be assessed. Finally, the properties of the materials used in the structure has to be assessed. Among all the information required to carry out the structural assessment, the material properties proved to be the most difficult to assess. Accurate measurement of reinforcement inside the reinforced concrete members can be made with specialised equipment. At the time of constructing many of the textile factories in



Bangladesh, concrete was site-mixed, and due to the lack of natural gravel, brick chips were used as a substitute in many building structures. At the construction time, quality control was not rigorously applied and there are a general lack of records on concrete test results from construction sites. All these factors resulted in a large strength variation of concrete strength, which needs to be accurately assessed in the existing structure. *Currently, the methods available for the non-destructive assessment of concrete strength are not able to provide the degree of accuracy required to accurately and safely assess the already loaded buildings.* This situation is resulting in a high degree of uncertainty in the structural assessment. **TRUSS will study existing concrete strength assessment methods then develop new methods and techniques to assess the strength of stressed concrete in existing buildings. The results are to be directly applicable into the building structural assessment and for that they need to be reliable.** In the 1st phase, *Arup* and University College Dublin (*UCD*) will establish the statistical correlation between tested and measured concrete strength of existing structures based on existing methods and techniques. In the next phase, new methods and techniques will be suggested and studied in details to assess their applicability, factors influencing results and variation of results. At the end of this phase, the methods and techniques will be refined to improve their reliability and accuracy. In the 3rd phase, the newly suggested methods and techniques will be applied to actual structures. Results will be compared with those obtained from the currently existing methods.

Objectives

The objective is quantifying the uncertainty in concrete strength assessment of existing buildings. A statistical correlation between tested and measured concrete strength of existing structures will be made based on existing methods and techniques. New methods will be suggested and compared to results on actual structures using currently existing methods.

Expected Results

New methods and techniques for assessing concrete strength in existing structures more accurately and reliably than the current methods.

Secondment

This position involves a secondment of some months to University College Dublin (*UCD*). The ESR will use the material and structural laboratory facilities in *UCD* to carry out analytical and experimental work on the new methods and techniques.

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 and Concrete Technology.
- 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.
- Candidates are required to spend extended periods in Bangladesh collecting site data and carrying out control tests in a Bangladeshi Academic institution. Local knowledge is desirable but not mandatory.

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