Job Title: Young Graduate Trainee for Assessment of Environmental Effects on Adhesive Bond Lines

Req ID **4005** - Posted **26/01/2018**

EUROPEAN SPACE AGENCY

Young Graduate Traineeship Opportunity in the Directorate of Technology, Engineering and Quality.

ESA is an equal opportunity employer, committed to achieving diversity within the workforce and creating an inclusive working environment. Applications from women are encouraged.

Post

Young Graduate Trainee for Assessment of Environmental Effects on Adhesive Bond Lines
This post is classified F1.

Location

Noordwijk, Netherlands (NL)

Our team and mission

The Materials' Physics & Chemistry Section is operating state of the art space simulation facilities (vacuum, temperature, EM & particle radiation...) as well as instruments to characterize physical & chemical properties of within the Materials & EEE components laboratory .

It is providing engineering support to all ESA projects and development programmes in the area of Materials' Physics and Chemistry, associated processes and environmental effects.

What we do:

- Physical Analysis and characterisation of materials including phase transitions, thermo-mechanical analysis, thermo-optical analysis, thermal analysis, surface analyses such as Electron based imaging techniques (SEM/EDX/WDX), X-ray techniques such as Xray Tomography and other non-destructive evaluation techniques.
- Chemical Analysis and characterization of materials (All types of spectroscopy like UV-VIS-NIR, GCMS, NMR, FTIR, Raman, thermal analysis, surface analysis like XPS, EDX,WDX, contact angle).
- Cleanliness & Contamination Control including laboratory work focused on contamination monitoring, materials outgassing characterization, surface analysis and evaluation of contamination impacts on performance.
- Environmental evaluation (ground/space effects) including laboratory testing work and support of Non Conformance Reviews and Requests for Approval. This includes the evaluation of degradation effects due to (long term) storage and corrosion, biodegradation, entry and re-entry assessment of physical/chemical processes and other processes.
- Performance prediction and verification (incl. in-orbit & post flight analysis) of materials and associated processes.
- Advising project teams on the selection and validation of materials, such as polymers. ceramics, optical materials, composites and their associated processes, such as curing,bonding,coatings, etc
- Materials and Processes Control Boards (MPCBs) are supported together with other collaborating sections.

Interested candidates are encouraged to visit the ESA website.

Field(s) of activities

Non Destructive Inspection (NDI) of Adhesive bondlines, is a very important area of interest for space materials, and also something that is very difficult to achieve for aerospace industry (the aircraft industry has been researching techniques to help them screen primary structures that are co-bonded for several years, but with no clear answer). In particular environmental effects (ground/space) can have a big impact on the assessment of the reliability of adhesive bond lines.

X-Ray Tomography (XrayCT) is a technique that could be optimized to inspect visually the adhesive bond of a given specimen or component and thereby assess whether the bond is suitably manufactured and can be expected to perform as designed. This type of assessment could be extended to inspect specimens of different non-metallic materials and elements such as photo-voltaic elements (sub-components making up solar arrays).

This subject overlaps with both the key expertise areas of adhesives, composites and also NDI techniques.

The selected YGT shall perform a literature review on X-Ray tomography (XrayCT), the purpose, uses and limitations, particularly for manufacturing and adhesive assessment (e.g. what can you expect to achieve with XrayCT?). The existing database of reports and case studies within the materials group shall also be investigated to identify cases where XrayCT could have been useful to identify the details of bond-line or interface failures.

The YGT shall assess some known specimens of interest, such as composite panel bond lines, or photo-voltaic element bonding to composite substrates, to assess whether XrayCT can be used to visualise the bond lines to the extent that is required to judge the quality of the bond. This shall be compared to other means of inspecting the same specimens that are also available in the lab, such as Optical Microscopes or Scanning Electron Microscopes. A particular emphasis shall be placed on the assessment of environmental effects on bond lines caused for instance by ground ageing or ageing under space conditions. This will require the use of additional physical/chemical materials analysis techniques.

The outcome shall include a proposed development or update of standard procedures tailored for the department samples analysed by XrayCT and other additional physical/chemical materials analysis techniques, The proposed guidelines shall also include a first attempt at defining a set of 'initial guideline parameters' to set the XrayCT machine, for assessment of different types of materials.

Technical competencies

Knowledge of relevant technical domains
Relevant experience gained during internships/project work
Breadth of exposure coming from past and/or current research/activities
Knowledge of ESA and its programmes/projects

Behavioural competencies

Self Motivation
Communication
Continuous Learning
Cross-Cultural Sensitivity
Teamwork

Education

Applicants should have just completed, or be in their final year of a University course at Masters Level (or equivalent) in a technical or scientific discipline.

Additional requirements

Experience in some form of Non Destructive Investigation techniques and understanding of Fibre Reinforced Composite materials is an asset.

In addition to the above competencies, applicants should demonstrate good interpersonal skills and the capacity to work both independently and as part of a team.

Applicants must be fluent in English and/or French, the working languages of the Agency. A good proficiency in English is required. Knowledge of another Member State language would be an asset.

During the interview the candidates' motivation and overall professional perspective/career goals will also be explored.

Other information

For behavioural competencies expected from ESA staff in general, please refer to the ESA Competency Framework.

The closing date for applications is 11 February 2018.

If you require support with your application due to a disability, please email contact.human.resources@esa.int.

Please note that applications are only considered from nationals of one of the following States: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the UK, or Slovenia as an Associate Member, Canada as a Cooperating State, Bulgaria, Cyprus, Latvia, Lithuania and Slovakia as European Cooperating States (ECS).
Priority will first be given to candidates from under-represented Member States.

In accordance with the European Space Agency's security procedures and as part of the selection process, successful candidates will be required to undergo basic screening before appointment