Training Opportunity for Lithuanian Trainees

Reference	Title	Duty Station
LI-2016-TEC-QTM	**Direct Printing of Functional Tracks**	**ESTEC**

Overview of the unit's mission:

The Components Technology and Space Materials Division, within the Product Assurance and Safety Department, primarily covers Materials and Electrical, Electronic and Electromechanical (EEE) components technology and development, reliability assessment and industrialisation. It is responsible for the technical management of materials and components space evaluation, verification and qualification.

The work proposed will be carried out within the Materials Technology Section. The activities performed within the remit of the Materials Technology Section include:

- The qualification for space flight of all advanced metallic materials, structural ceramics and glasses as well all related manufacturing and surface treatment processes for all ESA spacecraft and launchers programme
- The development of revolutionary materials and innovative manufacturing technologies both internally and in cooperation with other space agencies and organisations
- The failure investigation of materials and processes underperforming and impacting ESA space missions
- The development, certification and support of new European industrial capabilities, manufacturing processes and manpower skills training related to space applications of materials and components
- The establishment and implementation of requirements and standards for the development and the procurement of space grade materials and manufacturing processes
- The development, maintenance and improvement of the European Space Materials Database, storing all relevant data generated for materials and processes intended for Space use

Overview of the field of activity proposed:

Engineering of materials is rapidly developing with 3D printing technologies where the design rules are notably different from those of traditional manufacturing and assembly methods used in space hardware. 3D printing promotes curved and complex shapes on which even sometimes, flat parts are added to attach sensors and actuators.

It is proposed to address the possibilities offered by conformal printing also named direct writing on additively manufactured parts. The trainee will evaluate the surfaces and shape characteristics that are compatible with direct writing to:

- Deposit an insulating layer (or tracks) on the materials widely used in Space additive manufacturing (i.e. titanium and aluminium alloys)

- Deposit conductive layer (or tracks) on other materials used in Space additive manufacturing (i.e. PEEK, CFRP and insulating tracks or layers)

The reliability and durability of those tracks will be studied with respect to the specific environments encountered in space industry (including vacuum and thermal incursions).

The trainee should focus on direct writing manufacturing and review the current state of the art addressing manufacturing techniques in the frame of electronics and space applications. The possibility to use those techniques for actuators, sensors and electronic circuits will be investigated. This could define a new way to create electronic assemblies enabling innovative concepts and completely new design possibilities.

Required education:

Applicants should have just completed, or be in their final year of a University degree at Masters Level (or equivalent) in a technical or scientific discipline, preferably in material science covering metallic, polymeric and/or composite materials. It is an asset to have understanding of materials analysis techniques such as microsectioning, optical microscopy, electron microscopy and thermal vacuum testing.

Applicants should have good interpersonal and communication skills and should be able to work in a multi-cultural environment, 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.