

Training Opportunity for Portuguese Trainees

Reference	Title	Duty Station
PT-2019-TEC-MSP	Materials and Processes Engineering	ESTEC

Overview of the unit's mission:

The Structures Mechanisms and Materials Division TEC-MS is the centre of competence of the Agency in all areas related to Spacecraft and Launcher Structures, and Mechanisms, Tribology and Pyrotechnic devices, as well as Materials and Processes. This encompasses spacecraft and launcher lightweight structures, stable structures, advanced mechanical materials applications, structural dynamics, damage tolerance, deployable structures/booms, active structures, hold-down and release devices, electrical motors for space mechanisms, launcher and re-entry vehicle hot- and cold structures, landing attenuation systems, seals, valves, parachute systems, separation systems, solar array drive mechanisms, reaction wheels, pointing mechanisms, pyrotechnics, bearings and tribology aspects. It provides support to projects, preparatory programs and technology programs.

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

- The qualification for space flight of all advanced metallic and non-metallic materials, structural ceramics and glasses as well as 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

In order to achieve its objectives, the Materials and Processes Section has also direct access to the world leading ESTEC Materials and Electrical Components Laboratory, covering the full spectrum of materials characterisation testing capabilities.

Overview of the field of activity proposed:

The European Space Agency has recently proposed the ESA Advanced Manufacturing Cross-Cutting Initiative, which captures the opportunity of adopting revolutionary manufacturing capabilities, advanced materials and associated processes and creates sustainable competitive advantage for the European Space Industry in the global market.

The current space missions are often limited in their performances and scientific achievements by the traditional manufacturing processes/concepts. Though, Advanced Manufacturing technologies are readily available in the current European industrial landscape, these can be adopted for next generation space hardware manufacturing. This will enable new and highly innovative spacecraft and launchers designs, with significantly reduced manufacturing constraints (including costs and lead-time) and tremendous performances improvement.

Through this initiative, the Agency has identified a number of highly innovative materials and associated manufacturing processes which can be span-in and which will be matured to a space qualification level. In particular the following materials and processes are currently targeted:

1. Additive Manufacturing
2. Friction Stir Welding
3. Solid State Joining Technologies for hybrid (metallic/Non-metallic) joining
4. Laser Shot Peening for structural integrity enhancement
5. Advanced Fibres Reinforced Polymer Composite
6. Composite Materials for high impact/high radiation protection
7. Advanced surface engineering for thermal/corrosion management

The candidate will use the world leading facilities of the ESA/ESTEC Materials and Electrical Components Laboratory, in order to characterise all the above advanced materials and manufacturing processes, with particular focus on fibres reinforced plastics and textiles.

The aim of his work will be to perform detailed materials investigations, verification testing as well as, where required, failure investigation. Final goal is to provide an in-depth understanding of the performances of the identified technologies and provide recommendations for further improvement in view of their space application in highly demanding environments.

Required education:

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

In addition, applicants should demonstrate good interpersonal skills and the capacity to work both independently and as part of a team. During the interview the candidates' motivation and overall professional perspective/career goals will also be explored

Applicants should have just completed (conclusion not older than two years) or be in their final year of a university course at Master's level in a technical or scientific discipline.

Candidates must be fluent in English or French, the official languages of the agency