

## Training Opportunity for Portuguese Trainees

Reference	Specialist Area	Duty Station
PT-2012-TEC-MSS	Structural Engineering	ESTEC

### **Overview of the Division missions:**

The Structures and Mechanisms Division TEC-MS is the centre of competence of the Agency in all areas related to spacecraft and launcher structures and mechanisms, encompassing 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 hot and cold structures, landing attenuation systems, seals, valves, parachute systems, separation systems, reaction wheels, gyros, bearings and tribology aspects. It provides support to projects, preparatory programs and technology programs. Within this frame, the Structures Section TEC-MSS is in charge of all structural engineering aspects

### **Overview of the field of activity proposed:**

1. Perform / evaluate instrument / satellite accommodation studies, familiarization with project requirements and CAD tools.
2. Perform structural static / dynamic / vibro-acoustic / shock analyses (Nastran, Abaqus, Samcef, Rayon/VA-One, Dytran), in support to on-going spacecraft and launcher programs.
3. Participate to the definition / improvement / verification of structural & configuration analysis tools (including participation to and development of the satellite Concurrent Design Facility).
4. Perform Fracture Mechanics Analysis and evaluate material properties for manned and unmanned spacecraft (ESACRACK, FRAMES-2, StressCheck).
5. Participate to the definition /improvement/ verification of FSI (Fluid Structure Interaction) analysis tools with emphasis in sloshing, water landing and parachute deployment structural applications.
6. Perform numerical simulations of micro-gravity related problems considering characterization of disturbers at the source and evaluation of possible isolation and attenuation of the environment at the target.
7. Support the development of new technologies for structural design / hot structures concepts and materials/health monitoring concepts for Reusable Launch/Re-entry Vehicles, including related engineering analyses and support to on-going programmes.
8. Participate in the definition and post processing of mechanical test programmes, including the development and application of tools for mathematical model correlation / cross-checks between analytical predicted and experimentally identified modes, deflections, strain.
9. Participate in the development and application of the Agency's structural analysis tools (e.g. ESACOMP, Nastran, Samcef) for spacecraft and launcher composites structures, including the evaluation of composite test methods and implementation of relevant interfaces in FRAMES-2, ESACOMP.
10. Participate in the development of tools and methodologies for dynamic analysis of spacecraft and launchers, e.g. Coupled Loads Analysis and Shock propagation analysis, low, medium and high frequency.
11. Participate to the development of stochastic analysis/design methods, e.g. for the areas Damage Tolerance, mathematical model correlation, buckling and thermo-elastic stability.

### **Required Education:**

Applicants should have just completed, or be in their final year of a University course at Masters level in: Aeronautical / Mechanical Engineering, with some knowledge of the topics to be addressed. (e.g. composites, active control, hot structures, hyper-velocity, structural dynamics). Candidates must be fluent in English or French, the official languages of the Agency.