



University of Toronto Institute for Aerospace Studies
4925 Dufferin Street, Toronto, Ontario, Canada, M3H 5T6

Mechanical Engineer – Structures, Mechanisms, Thermal Control

Level Definition: This level covers positions involving the application of engineering knowledge and training in the design, development or modification of new or existing spacecraft structures, mechanisms and/or thermal control systems, including the analysis, design, prototyping, assembly, integration and testing of all the necessary components. Employees may provide guidance to junior engineers and technical staff. They may also interact with graduate students undertaking research relevant to spacecraft structure, mechanism or thermal development.

Typical Duties: Typical duties may include:

- Designing, prototyping, assembling and/or testing spacecraft structures and mechanisms that meet the requirements of the components being housed and loads and vibration requirements imposed by launch vehicles and operating environments.
- Developing finite element models for static and dynamic analyses of the designed spacecraft structures. Analyzing spacecraft structures using finite element models and/or hand calculations.
- Creating drawings and specifications to convey the structure designs to other engineers and consultants. Creating solid models of internal and external spacecraft layouts. Maintaining mass budgets and allocations. Producing drawings for machining and fabrication using CAD tools. Coordinating with machine shops and suppliers.
- Performing mechanical fit checks, assembly, and integration.
- Defining and performing structural shock and/or vibration tests.
- Selecting, defining, acquiring, installing and/or identifying facilities to support structural and/or thermal development and testing. This includes developing or acquiring any necessary software.

- Interacting and communicating with consultants that are supporting structure development or thermal analysis and control design. This includes coordinating analyses and prototyping and testing activities.
- Developing thermal analysis models based on material properties and spacecraft configuration.
- Analyzing spacecraft configurations using thermal analysis models and knowledge of various mission scenarios.
- Performing trade analyses on alternate spacecraft configurations.
- Defining the spacecraft arrangement and thermal control materials necessary to maintain satisfactory temperatures for all spacecraft components.
- Prototyping, assembling, and/or testing thermal control equipment.
- Performing thermal vacuum tests to verify the thermal model.
- Performing thermal functional tests of various spacecraft components.
- Communicating with other engineers to specify requirements on, and obtain requirements from other spacecraft subsystems that are affected by the structural or thermal designs.
- Interacting via meetings, e-mail, phone, and facsimile with consultants to the Space Flight Laboratory, so as to obtain comments and review of analysis and design efforts, component selection and acquisition, and assembly and testing procedures.
- Communicating designs to reviewers and systems engineers.
- Supervising other engineering officers and interacting with graduate students who contribute directly to the structure and thermal subsystems currently being worked on. This includes students whose theses are related to spacecraft structure or thermal design.
- Preparing or reviewing plans, specifications and designs produced by subordinate engineering officers for structure and thermal spacecraft subsystems.

- Reporting to the Space Flight Laboratory Director and/or senior staff with regard to technical progress, costs, and ability to meet schedule.
- Preparing cost estimates for new structures or thermal control systems or modifications to existing systems.
- Advising on design feasibility and cost.
- Facilitating new development contract opportunities for the Space Flight Laboratory through interaction with other engineers in the structure or thermal control field.

Decision Making:

Exercises judgment in the application or adaptation of engineering methods and techniques to design or modify equipment and instrumentation to meet performance objectives. Makes recommendations on the purchase of commercial equipment and the placing of contracts with outside contractors. Selects materials and decides on recommended designs and design changes obtained from consultants or other engineers. Assists in the definition of the technical content of student work packages in consultation with the Space Flight Laboratory Director and senior staff. Determines best assembly and testing procedures to follow.

*Supervision
Received:*

Works under the technical, budget, and schedule direction of the of the Space Flight Laboratory Director and senior staff, conducts independent studies and analyses and provides interpretations and conclusions. Complex or unusual problems are normally resolved in consultation with supervisor.

*Supervision
Exercised:*

May provide guidance to graduate students assisting with development through thesis or course work. May supervise junior engineers, technologists or draftsmen when they are employed on the same projects.

Qualifications:

Bachelor's degree in Mechanical Engineering with specialization in the structures and/or thermal area. Four years relevant experience following graduation or demonstrated equivalent capability. Space industry experience preferred.

Contact:

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University of Toronto Institute for Aerospace Studies
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