

Space Inflatable Structures

Mechanical Design & Analysis

The definition of needs for futur Space equipments - deployed surfaces - has recently led engineers to a technology breakthrough : Space inflatable structures (a.k.a. **Gossamer structures**). This technology consists in using stretched thin-film membranes as supports for active elements (such as solar cells or RF patches) deployed and maintained in place using an inflatable and rigizable support structure. These new types of structures have specific characteristics making the current design and analysis tools and techniques unappropriate.

In this advanced environment, we can help you design and verify your futur Space structures by providing you with our unique experience and expertise in this field.

Mechanical design

Our knowledge and experience of the Gossamer structures technology allow us to provide a significant added value to the following tasks :

- ▶ Definition of technical requirements,
- ▶ Feasibility study,
- ▶ Trade-off,
- ▶ Dimensioning (hand-calculation / FEA)
- ▶ Material selection,
- ▶ 3D CAD Modeling,
- ▶ Nomenclature / BOM,
- ▶ Geometric dimensioning and tolerancing,
- ▶ Drafting and detailing.

At the end of a complete study, we can provide the followings:

- ▶ Design report,
- ▶ Drawings (Assembly / Details),
- ▶ Development plan.

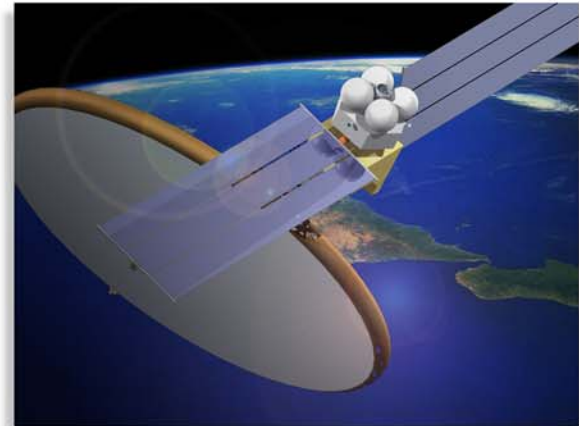


Structural analysis

Unlike typical 'stiff' structures, Gossamer structures have to be considered differently.

We can help to fulfill the two following objectives:

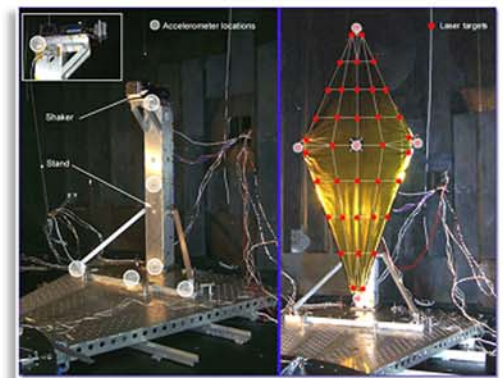
- ▶ Dimensioning (i.e. to achieve minimum frequency),
- ▶ Performance evaluation:
 - Detailed stress analysis,
 - Dynamic analysis (modal / frequency response),
 - In space environment (vacuum, μ -gravity),
 - In lab environment (including air and gravity).
 - Buckling and post-buckling analyses,
 - Characterization of wrinkling in stretched thin-film membrane structures,
 - Deployment simulations.



Support for mechanical test planning

Due to the unconventional characteristics of Gossamer structures, we can provide you with our expertise in the definition of mechanical testings:

- ▶ Definition of test objectives,
- ▶ Selection of test means,
- ▶ Definition of test sequences,
- ▶ Synthesis: writing of test plan.



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