

DEPLOYTECH

Development and Testing of Gossamer/Deployable Structures for Use in Space



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InflateSAIL Deorbiting System



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ABSTRACT

The objective of DEPLOYTECH is to develop three specific, useful, robust, and innovative large deployable space structures to a TRL of 6-8 in the next three years. These include: a 5m x 5m sail structure that uses inflatable technology for deployment and support; a 5m x 1m roll-out solar array that utilizes bistable composite booms; and 14m solar sail CFRP booms with a novel deployment mechanism for extension control.

LARGE DEPLOYABLE TECHNOLOGIES FOR SPACE

Large deployable space structures are needed as the backbone for various space systems and as an integral part of large reflectors, Earth observation satellite antennas and radars, radiators, Sun shields and solar arrays. Advances in launch vehicle design have been limited to date, and have not resulted in an increase in fairing size in the last three decades.

Deployable structures come with the promise and capability of reducing mass substantially on spacecraft and allowing for very compact systems to be stored during the launch phase. Also, there is a current growing need for larger apertures, solar panels, thermal shields and gossamer sails. Hence, it is important that large deployable structures are further developed and de-risked. The Technology Readiness Level (TRL) of a great part of these technologies is still very low in the order of 2-3.

Thus, the objective of DEPLOYTECH is to develop three specific, useful, robust, and innovative large deployable space structures to a TRL of 6-8 in the next three years. These include: a 5m x 5m sail structure that uses inflatable technology for deployment and support;

a 5m x 1m roll-out solar array that utilizes bistable composite booms; and 14m solar sail CFRP booms with a novel deployment mechanism for extension control. Also, during this project several specific modeling activities will take place, from an analysis of proper folding for membrane and tube structures to the controllability of extension, modeling the deployment dynamics of several structures to an improved analytical model for bistable composite tubes.

QUESTIONS & ANSWERS

What is the project designed to achieve?

The objective of this project is to develop 3 specific, useful, robust and innovative large space deployable technologies:

- 5m x 5m inflatable sail
- 1m x 5m deployable solar array
- 14m solar sail booms

The aim is to develop these technologies from a current TRL of 2-3 to 6-8 within the 3 years of the proposed DEPLOYTECH project.

Why is this project important for Europe?

Space deployable structures (gossamer structures) are complex and the development/testing of such systems can be challenging and expensive. The DEPLOYTECH project brings a group of world leaders, in the field, in Europe and will push the TRL of the technology through coordinated development of key technologies in order to mature deployable structure technology in the near term for future use in space.

How does this project benefit European citizens?

European citizens will be able to benefit from the use of new space technology, which can potentially enable more efficient, lighter (mass) and flexible space structures and systems to be used in space. New missions/space applications can be conveyed using ultra-light structures such as solar arrays, solar sail propulsion systems and deorbit systems in a more cost effective, flexible manner.

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LIST OF PARTNERS

- University of Surrey, United Kingdom
- DLR, Germany
- Astrium, France
- RolaTube, United Kingdom
- Cambridge University, United Kingdom
- Athena-SPU, Greece
- TNO, Netherlands
- CGG Technologies, Netherlands

COORDINATOR

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PROJECT INFORMATION

Development and Testing of Gossamer/Deployable Structures for Use in Space (DEPLOYTECH)

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Estimated total cost: € 2.523.511,55