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Project title:	Space-R-eflector: Development of a versatile, flexible and deployable reflector surface structure for satellite antennas
Partner:	Large Space Structures GmbH
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A Large Deployable Antenna (LDA) consists of numerous components. One of the key components of this reflector antenna is the reflector surface. In the lasts decades different types of reflector surfaces have been developed and used (metal mesh based reflector surfaces, membrane based reflector surfaces, etc.) In the project Space-R-eflector a new innovative reflector surface is developed by Large Space Structures GmbH, LSS (concept) and ITA (production technology).

Metal mesh based reflector surfaces are produced as weft or warp knitted fabrics. Currently, knitting machines with a gauge of E24 or higher are generally used to produce warp knitted metal mesh reflecting surfaces. Tungsten or molybdenum is used as yarn material. Warp knitted meshes have been previously developed at ITA for use in the surface of large deployable reflector antennae. In this project, however, the spacer fabric technology used to develop reflector surfaces will be investigated.

Warp knitted spacer fabrics are defined as fabrics with two knitted outer surfaces connected by a pile yarn. Since a spacer fabric is produced in a single step process, all three layers are intertwined, thus ensuring the continuous distribution of load. Given the properties of knitted fabrics, these structures, as well, are drapeable and foldable as in the case of conventional metal mesh reflector surfaces. The connecting pile yarn provides the necessary integral path for transmission of loads. The separation distance between the two face sheets provides an increased stiffness.

In this project, the industry partner LSS defines the requirements and frameworkfor the project. The two project partners develop designs that are optimized by LSS in a numerical simulation. On this basis, ITA will develop a suitable warp knitted spacer pattern and produce the reflector surface. The developed components will be tested according to the requirements. At the end of the project a reflector antenna demonstrator will be produced.

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