

MATERIALS AND STRUCTURES SYMPOSIUM (C2)

Space Structures II - Development and Verification (Deployable and Dimensionally Stable Structures) (2)

Author: Dr. Thomas Sinn
HPS GmbH, Germany

Mr. Stephan Endler
HPS GmbH, Germany

Mr. Paolo Proietti Zolla
HPS GmbH, Germany

Mr. Maurizio Lori
HPS GmbH, Germany

TOWARDS A EUROPEAN LARGE DEPLOYABLE ANTENNA: OVERVIEW OF CURRENT
DEVELOPMENT ACTIVITIES**Abstract**

The need for Large Deployable Antennas (LDA) is not a new one, and has been addressed since the very beginning of space communication. The demand for ever bigger apertures is, and will be, always present throughout the electromagnetic spectrum, including optical and high energy devices, as it is the most effective way to observe or process faint sources or operate with lower power consumption and focalize energy on wanted areas without disturbing or being disturbed by the surrounding areas. From the European point of view there is currently a total dependence on foreign sources as large deployable reflectors (LDAs) are not available from European suppliers. Over the last 7 years, HPS GmbH together with partners like Large Space Structures (LSS) GmbH has been working on the development of large deployable reflectors as part of several ESA and German activities. The three latest activities that are discussed more in detail in this paper are the ESA funded projects SCALABLE, MESNET and ABDS. The goal of the SCALABLE project (2013-2016) was to identify, design and demonstrate by bread boarding the mechanical feasibility of a European large antenna reflector dish having intrinsic scaling capability to cover 4 to 18 m projected aperture diameter and frequency range from UHF to Ka-band. As a proof of concept, a deployable demonstrator (bread-board) model with 5 m projected aperture diameter was developed, manufactured and tested under ambient conditions. Furthermore, a knitted mesh consisting of gold-plated Tungsten has been developed and tested for its mechanical and RF performances. The MESNET project (2016-2017) is a direct follow up to the SCALABLE project looking into improving the reflector design and manufacturing to achieve lower RMS for application in higher frequencies (up to Ka band). Also, the mesh development started in SCALABLE was continued for higher frequency applications including test for RF and PIM. To enable the assembly of a whole antenna including deployable boom, the ABDS activity (2016-2018) has the goal of designing, manufacturing and testing of an ultrastable boom with a 6m demonstrator that will be environmentally tested. This paper will give an overview on the three projects and discusses the results obtained of the breadboard and demonstrator tests. The development plan towards a European Large Deployable Antenna with an in-orbit demonstration by 2020/2021 will be presented as well.