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FOCUS – FIRST ORBITAL CURING EXPERIMENT OF UNIVERSITY STUDENTS

Abstract

FOCUS – First Orbital Curing experiment of University Students – is a micro gravity space experiment realized by a group of aerospace students from Technische Universität München, conducted within the European REXUS sounding rocket programme. FOCUS investigates a new concept for manufacturing ultra large structures in space, which still poses a big engineering challenge with the present technologies. Having a simple and reliable process to realize such structures would be valuable when it comes to applications such as solar arrays or radio antennas and especially solar sails. Today's deployment technology of mast-like structures basically means deployment in space by unfolding a previously stowed structure using hinges or rotational axes of minor stiffness within the structure itself. FOCUS investigates another approach: A fibre composite structure is launched into space with its resin matrix still uncured which allows an almost free manipulation and an easy stowage. Once properly deployed, ultra violet radiation triggers the curing process and finally leads to a stiff structure. This kind of process would not only simplify the stowage, but also reduce mass due to the absence of hinges and more effective material utilization. To make this happen with a real application one day, the FOCUS team develops a very first demonstrator of this technology and will pave the way for future in-depth research. Having started the project in late 2009, it will be launched on an improved Orion sounding rocket from Esrange Space Center, Sweden in early 2011. The REXUS (Rocket borne Experiments for University Students) programme allows students from universities across Europe to carry out scientific and technological experiments on research rockets. It is realized under a bilateral Agency Agreement between the German Aerospace Center (DLR) and the Swedish National Space Board (SNSB).