

SPACE SYSTEMS SYMPOSIUM (D1)
Innovative and Visionary Space Systems Concepts (1)

Author: Mr. Marcello Valdatta

Alma Mater Studiorum - University of Bologna, Italy, marcello.valdatta@gmail.com

Dr. Federico Romei

Alma Mater Studiorum - University of Bologna, Italy, fede.pulsar@gmail.com

Dr. Antonio Spadanuda

Alma Mater Studiorum - University of Bologna, Italy, antonio.spadanuda@gmail.com

Dr. Stefania Toschi

Alma Mater Studiorum - University of Bologna, Italy, ste910@gmail.com

Dr. Gian Paolo Candini

Instituto de Astrofisica de Andalucia, Spain, gpaolo79@gmail.com

Dr. Jacopo Piattoni

Alma Mater Studiorum - University of Bologna, Italy, jacopo.piattoni@gmail.com

Dr. Fabrizio Piergentili

University of Rome "La Sapienza", Italy, fabrizio.piergentili@uniroma1.it

Prof. Fabio Santoni

University of Rome "La Sapienza", Italy, fabio.santoni@uniroma1.it

INFLATABLE SYSTEM BASED ON POLYURETHANIC FOAM

Abstract

REDEMPTION experiment for Rexus / Bexus programme allowed to test several solutions to use a particular foam. This substance is a bi-component poliuretanic foam which expands and becomes rigid. Thanks to REDEMPTION it has been possible to test this foam in near space conditions. One of the tests of REDEMPTION experiment was to use this foam like a inflatable rigid structure to deploy a boom. This test was a success also during ground test. This kind of boom can be deployed in a couple of seconds and thanks to a particular property of the foam can be bigger in volume than the two substances boarded on the space system. This boom could also supply a structure with good mechanical properties. Is a project completely conceived, designed and realised within the Space Robotic Laboratory (SRL) of the II Faculty of Engineering of the University of Bologna "ALMA MATER STUDIORUM", based on REDEMPTION (REmoval of DEbris using Material with Phase Transition: IONospheric tests) experiment has been selected to participate to REXUS/BEXUS 2012 Programme. REDEMPTION allowed to test several solutions to use a particular foam. This substance is a bi-component poliuretanic foam which expands and becomes rigid. Thanks to REDEMPTION it has been possible to test this foam in near space conditions. One of the tests of REDEMPTION experiment was to use this foam like a inflatable rigid structure to deploy a boom. This test was a success also during ground test. This kind of boom can be deployed in a couple of seconds and thanks to a particular property of the foam can be bigger in volume than the two substances boarded on the space system. This boom could also supply a structure with good mechanical properties. The paper describes the IBS inflatable system's characteristics, the mission's conguration, concept, design,process ow, mechanical assembling and the expected results.