SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 2 (3B)

Author: Mr. Filippo Mailland
OHB Italia SpA, Italy, fmailland@cgspace.it

Ms. Kelly Geelen
ESA, The Netherlands, kelly.geelen@esa.int
Dr. Pierre Coste
European Space Agency (ESA), The Netherlands, pierre.coste@esa.int
Dr. Mirco Zaccariotto
CISAS – "G. Colombo" Center of Studies and Activities for Space, University of Padova, Italy, mirco.zaccariotto@unipd.it
Prof. Stefano Debei
CISAS – "G. Colombo" Center of Studies and Activities for Space, University of Padova, Italy, stefano.debei@unipd.it
Mr. Carlo Bettanini
CISAS – "G. Colombo" Center of Studies and Activities for Space, University of Padova, Italy, carlo.bettanini@unipd.it
Dr. Silvio Cocuzza
CISAS – "G. Colombo" Center of Studies and Activities for Space, University of Padova, Italy, silvio.cocuzza@unipd.it
Mr. Emanuele Piersanti
OHB Italia SpA, Italy, emapier83@gmail.com
Mr. Emanuele Monchieri
Compagnia Generale per lo Spazio, Italy, emonchieri@cgspace.it

SAMPLE CANISTER CAPTURE MECHANISM FOR MARS SAMPLE RETURN: DESIGN AND TESTING OF AN ELEGANT BREADBOARD MODEL

Abstract

The paper provides the first highlights on the ESA Study: Sample Canister Capture Mechanism Design and Breadboard, done under the Mars Robotic Exploration Preparation (MREP) program. The Study is part of a set of feasibility studies aimed at identifying, analysing and developing technology concepts enabling the future international Mars Sample Return (MSR) mission. The MSR is a challenging mission with the purpose to send a Lander to Mars, acquire samples from its surface/subsurface and bring them back to Earth for further more in depth analyses. In particular, the technology object of the Study is relevant to the Capture Mechanism that, mounted on the Orbiter, is in charge to capture and secure the Sample Canister accommodating the Martian soil samples, previously delivered in Martian orbit by the Mars Ascent Vehicle. Such a technology has been investigated in several past studies, where different concepts based on partial (with rigid frame) or fully inflatable mechanisms have been considered, demonstrating several unsolved criticalities. A new robust concept based on simplicity, lightness and compactness has been developed, able to meet an updated set of requirements coming from the past experimental activity results. The design of such a concept is reported in the paper, based on the technological trade-offs performed, together with the preliminary results of the ongoing breadboarding activities.