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# SAMPLE CANISTER CAPTURE MECHANISM FOR MARS SAMPLE RETURN: FUNCTIONAL AND ENVIRONMENTAL TEST OF THE ELEGANT BREADBOARD MODEL

**Abstract**

The paper provides recent updates about the ESA study: Sample Canister Capture Mechanism Design and Breadboard developed under the Mars Robotic Exploration Preparation (MREP) program. The study is part of a set of feasibility studies aimed at identifying, analyzing and developing technology concepts enabling the future international Mars Sample Return (MSR) mission. The MSR is a challenging mission with the purpose of sending 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 or Orbiting Sample accommodating the Martian soil samples, previously delivered in Martian orbit by the Mars Ascent Vehicle. An elegant breadboard of such a device has been implemented and qualified under a collaboration between OHB-CGS SpA and Politecnico di Milano, Aerospace Science and Technology Department: in particular, functional tests have been conducted at PoliMI-DSTA and thermal and mechanical test campaigns occurred at the Serms srl Italian facility. The effectiveness of the breadboard design has been demonstrated and the obtained results, together with the design challenges, issues and adopted solutions are critically presented in the paper. The breadboard is now ready to be tested on a parabolic flight, to occur nex fall, to raise its TRL to 5; the microgravity experiment design and adopted solutions are presented as well in the paper.