

SPACE EXPLORATION SYMPOSIUM (A3)
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Author: Dr. Peter Hofmann
OHB System AG - Munich, Germany, dr.peter.hofmann@online.de

EXOMARS: STATUS OF THE SAMPLE PREPARATION AND DISTRIBUTION SYSTEM (SPDS)
FOR THE EXOMARS ROVER**Abstract**

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EXOMARS: STATUS OF THE SAMPLE PREPARATION AND DISTRIBUTION SYSTEM (SPDS)
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Dr. Peter Hofmann, peter.hofmann@kayser-threde.com Dr. Lutz Richter Dr. Timo Stuffer
Kayser-Threde GmbH, Wolfratshauser Strasse 48, 81379 Munich, Germany Phone: +49 89 724 95-211,
Fax: +49 89 724 95-291

Abstract

The ExoMars Rover mission scheduled for launch in 2018 as a joint European / Russian project has the primary goal to search for signs of existing or extinct life on Mars. This shall be achieved by landing a rover on Mars which is equipped with a deep drill and an Analytical Laboratory Drawer ALD which houses payload instruments specifically associated with the analysis of the drill samples. It includes an Ultra-Clean Zone which protects against terrestrial contaminations and provides all mechanisms for sample preparation and distribution (SPDS) to the scientific instrument.

The SPDS / ALD is being developed by Kayser-Threde under subcontract to TAS-I to supply the scientific instruments of the ExoMars rover with granular Mars rock and soil samples of a specific particle size distribution. This is achieved through a set of mechanisms making up the SPDS which crush, meter ('dose') and distribute the subsurface samples acquired by the ExoMars drill. The sequence of operation can be controlled from ground but pre-defined operational sequences are embedded in the control electronics and will operate the SPDS in semi-automated way. Throughout the ExoMars Phase B work since 2007, the emphasis has been to develop and test breadboards and engineering models of the different SPDS mechanism, in parallel to doing the preliminary flight design. Hence high fidelity H/W models now exist for all the mechanism, and functional tests of the complete SPDS have been performed at ambient laboratory conditions and in simulated Mars environment. Moreover, parabolic flight campaigns have been conducted to address the influence of reduced gravity (Mars) on the flow of granular samples from one SPDS mechanism to the next and to support validation of a numerical simulation of the powder flow. The SPDS / ALD configuration has successfully passed the preliminary design review PDR end of 2013 and various hardware tests have been performed. The paper will highlight the major achievements and present results from the various hardware test campaigns.