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Curation Facility



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Remote Manipulation (RM) System for Mars Sample Receiving Facility (MSRF) - Outline of Activities and Early Results of European Space Agency (ESA) Technology Development

J. B. Vrublevskis¹, L. Berthoud¹, S. Hotakainen¹, Y. McCulloch¹, D. Pisla², C. Vaida², M. Hofbaur³, C.L. Smith⁴, H. Schroeven-Deceuninck⁵, M. van Winnendael⁵ and F. Gaubert⁵,
¹Thales Alenia Space UK Ltd, 660 Bristol Business Park, Coldharbour Lane, Bristol, UK, BS16 1EJ (John.Vrublevskis@thalesaleniaspace.com), ²Technical University of Cluj-Napoca, Research Center for Industrial Robots Simulation and Testing, 28, Memorandumului, Cluj-Napoca, 400114 Cluj, Romania (doina.pisla@mep.utcluj.ro), ³Joanneum Research Forschungsgesellschaft mbH ROBOTICS - Institute for Robotics and Mechatronics Lakeside B08a, 9020 Klagenfurt am Wörthersee, Austria (Michael.Hofbaur@joanneum.at), ⁴The Natural History Museum, Cromwell Road, London UK SW7 5BD (caroline.smith@nhm.ac.uk), ⁵ESA - ECSAT, Fermi Avenue, Harwell Campus, Didcot, UK, OX11 0FD (Hilde.Schroeven-Deceuninck@esa.int).

Inside the future Mars Sample Receiving Facility (MSRF) there are several critical systems^[1] that are required to perform all the identified operations^[2] in the defined environment to the imposed level of safety. One of these critical systems is the Remote Manipulation system which is required to remove the returned sample material from the many layers of spacecraft containment hardware^{[3][4]}, then in ultra-clean conditions, prepare the sample material for scientific investigation, conduct scientific investigation on the sample material to ensure no bio-hazard is present and finally to curate the sample material to allow worldwide scientific research.

Within the framework of the European Space Agency (ESA) “Mars Robotic Exploration Preparation” (MREP) Technology Development programme, a Remote Manipulator ‘Breadboard Model’ is being designed to determine the capabilities of this representative technology with required operations in a controlled environment to the defined level of safety. The demonstration testing of the ‘Breadboard’ Remote Manipulator system will especially focus on critical operations which have never been conducted before, these will be performed using a robotic arm with haptic feedback control and interchangeable end-effectors.

References: [1] A detailed design, operation and assessment of technology development required for a Mars Sample Return (MSR) Sample Receiving Facility (SRF), M. Guest et al. 61st IAC, Prague, 2010, [2] Report on the workshop outputs from the Working Group on Scientific Investigations to be conducted in the Mars Sample Receiving Facility, E913-010\Working group report, Draft, [3] “Design, breadboarding and testing of a Bio-Containment system for Mars Sample Return mission”, S. Senese et al. IAC63, Naples, 2012, [4] “Sample Tube Seal Testing for Mars Sample Return”, Paulo Younse, et al., 2014 IEEE Aerospace Conference, Big Sky, April 2014.

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