SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Novel Concepts and Technologies to Enable Future Building Blocks in Space Exploration and Development (3)

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DEVELOPING A LANDING SYSTEM – DESIGN AND BREADBOARD TESTS OVERVIEW

Abstract

Several mission studies have been performed focusing on a soft and precision landing using landing legs. Examples for such missions are Mars Sample Return scenarios (MSR), Lunar landing scenarios (MoonNEXT, Lunar Lander) and small body sample return studies (Marco Polo, MMSR, Phootprint). Such missions foresee a soft landing on the planet surface for delivering payload in a controlled manner and limiting the landing loads.

To ensure a successful final landing phase, a landing system is needed, capable of absorbing the residual velocities (vertical, horizontal and angular) at touch-down, and insuring a controlled attitude after landing. Such requirements can be fulfilled by using landing legs with adequate damping.

The Landing System Development (LSD) study, currently in its phase 2, foresees the design, analysis, verification, manufacturing and testing of a representative landing leg breadboard based on the Phase B design of the ESA Lunar Lander. Drop tests of a single leg will be performed both on rigid and soft ground, at several impact angles. The activity is covered under ESA contract with TAS-I as Prime Contractor, responsible for analysis and verification, Astrium GmbH for design and test and QinetiQ Space for manufacturing. Drop tests will be performed at the Institute of Space Systems of the German Aerospace Center (DLR-RY) in Bremen.

This paper presents an overview of design aspects and analytical simulations, comparing expected dynamic behavior with preliminary tests results, as available.