

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Interactive Presentations - IAF SPACE SYSTEMS SYMPOSIUM (IP)

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FEASIBILITY STUDY ON A CREWED MARS LANDER

Abstract

In recent years, Martian human exploration has attracted the attention of space agencies worldwide. This is especially highlighted by the increasing consideration that the ISECG's Global Exploration Roadmap has placed on the exploration of the Red Planet. Previous missions and studies have demonstrated that the Martian environment could allow the establishment of a permanent and sustainable human outpost. Indeed, Mars distinguishes itself from most other planets and moons in the Solar System because of the presence of water and an atmosphere.

With the recent increase in public interest in making life multi-planetary, support for human exploration missions has grown. Although it is possible to reach Mars with current hardware, one of the most complex parts of designing human exploration missions is related to the landing phase and subsequent ascent of a heavy, manned spacecraft. In addition, ensuring the safety of astronauts throughout entry, descent, and landing is one of the most crucial topics that has not been addressed in the development of previous robotic Mars missions.

These challenges have been investigated as part of the project work for the 15th Space Exploration and Development Systems (SEEDS) Specializing Master's Program, hosted by Politecnico di Torino, ISAE SUPAERO, University of Leicester in collaboration with Thales Alenia Space Italia, ALTEC, and endorsed by ASI and ESA. In this framework, a multicultural and interdisciplinary group of students worked to-

gether to develop the concept of a manned Martian lander.

This paper aims to summarize the outputs and lessons learned during the preliminary design of the crewed lander. In particular, the systems needed for entry, landing, supporting life and ascent have been considered. As a result, a trade study was performed considering the mass, risk, and cost of possible solutions.