

Building Habitats on Moon/Mars using In Situ Resources with No/Lo Earth Dependence

Abstract

Habitat building on moon has been a long sought-after human dream. The six successful Apollo missions became the impetus of renewed interest and fueled the passion for the conquest of moon during the past 50 or so years. However, moon (and other planets) are quite different from earth, in terms of composition and environment. The notion of existence of any form of life on them at any point of time up to now is only speculative. Hence, it is neither easy nor practical to imagine that transitioning to moon will simply be an extension of what we have and expect on earth. In this context, the availability of relevant materials and resources on a planets themselves offers the possibility of their utilization in generating propellants and other infrastructure that could assist long-term human endeavors, life support and eventual habitation.

The in situ resource utilization (ISRU) - either in the form of raw materials or as the finished structural and/or functional components - would ease the logistic burden, both on the international space station (ISS) and the earth. Thus, the benefits of ISRU are far greater for the manned space missions than for their robotic counterparts, simply because they are larger in scope and scale.

From system design point of view Johnson Space Center (Houston, TX), Kennedy Space Center (Cape Canaveral, FL), NASA Langley Research Center (Hampton, VA) and Glenn Research Center (Cleveland, OH) have made tremendous in-roads on ISRU-related aspects. This presentation is an attempt to forge a collaboration with CSM faculty to explore what else could be done with the resources available on the moon and Mars to help develop an infrastructure that would one day make these extraterrestrial bodies habitable.

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April 27, 2017