HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Lunar Exploration (1)

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SINTERHAB 2.0 - DEPLOYMENT, LIFE SUPPORT INTEGRATION AND ARCHITECTURE SPIN-OFFS

Abstract

This paper provides insight into the evolution of a lunar base design called Sinterhab that has explored the basics of the sintered regolith structures which are used as an important structural component of a lunar settlement. It also considers NASA space architecture and mission strategy elements for construction, expansion and growth of the base. The Sinterhab 2.0 is based on continuing research on this concept in areas of the automated construction process and integration of life support systems. The two elements of architecture will have a direct impact on the prefabricated structures deployment, automated regolith reinforcement and coating of the habitat using robotic systems. Specific geometries reflecting the Sinterhab concept are explored using either robotic regolith 3D printing system using robotic arms (such as Sinterator based on the NASA Athlete spider robot) or using a 3D printing scaffolding supportive system.

The structurally integrated Environmental Control Life Support System (ECLSS) is responsible for challenging tasks to utilize the water and waste management systems in the living areas (for enhancement of the astronauts' well-being) as a part of the radiation protection systems as well as nominal functions such as provision of food, water, and atmosphere recycling.

The research approach follows the philosophy of interconnection of space and terrestrial architecture, identifying and driving applications of space architecture principles from the Sinterhab 2.0 research which could be directly or indirectly applicable in buildings on Earth and vice versa. The Sinterhab 2.0 seeks the utilization of technologies that may advance a habitat or building systems in terrestrial architectures.