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Systems and Infrastructures to Implement Future Building Blocks in Space Exploration and Development (2)

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ADDITIVE CONSTRUCTION WITH MOBILE EMPLACEMENT (ACME)

Abstract

Additive Construction with Mobile Emplacement (ACME) is a NASA technology development project that seeks to demonstrate the feasibility of constructing shelters for human crews, and other surface infrastructure, on the Moon or Mars for a future human presence. Additive construction employs the principles of additive manufacturing on a human habitat structure-size scale. The ACME project will allow, for the first time, the 3-dimensional printing of surface structures on planetary bodies using local materials as construction materials, thereby tremendously reducing launch and transportation mass and logistics. Some examples of infrastructure that could be constructed using robotic additive construction methods are landing pads, rocket engine blast protection berms, roads, dust free zones, equipment shelters, habitats and radiation shelters.

Potential terrestrial applications include the development of surface structures using Earth-based materials for emergency response, disaster relief, general construction, and housing at all economic levels.

This paper will describe the progress made by the NASA ACME project with a focus on prototypes and full scale additive construction demonstrations using both Portland cement concrete and other indigenous material mixtures.