ABSTRACT

The study Lunar Exploration Architecture - Deployable Structures for a Lunar Base was performed within the Alcatel Alenia Space “Lunar Exploration Architecture” study for the European Space Agency. The purpose of the study was to investigate bionic concepts applicable to deployable structures and to interpret the findings for possible implementation concepts. The study aimed at finding innovative solutions for deployment possibilities. Translating folding/unfolding principles from nature, candidate geometries were developed and researched using models, drawings and visualisations. The use of materials, joints between structural elements and construction details were investigated for these conceptual approaches. Reference scenarios were used to identify the technical and environmental conditions, which served as design drivers. Mechanical issues and the investigation of deployment processes narrowed the selection down to six chosen concepts. Their applicability was evaluated at a conceptual stage in relation to the timescale of the mission.

KEY WORDS: Biomimetics, space architecture, deployable structure