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Space Architecture: Designing Human Systems Interaction (3)

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MODEL DESIGN PRINCIPLES FOR HUMAN HABITATS IN SPACE, OFF-GRID, AND IN
LOW-IMPACT COMMUNITIES

Abstract

The common denominator of thousands of years of architectural experience on Earth, and decades of such designs in space, is the human body and mind. Adding the elements of radiation mitigation, micro or reduced gravity, vacuum, temperature extremes, and other challenges for non-terrestrial designs has dramatically expanded both the problems and solutions to be addressed by architecture. By taking this multi-dimensional approach, we see that accepted constants of Earth architecture are now variables, and that brings the math, physics, and sustainable flows of the systems into a new light. This paper focuses on refining the design principles for any human habitat, then demonstrating the similarities, differences, and common lessons for each systematic architecture. By addressing the hardest problems of space settlement, one can then de-scope solutions to deal with the common elements of power independence, harsh environments, and self-sustaining recycling loops. One can then expand the parameters to design habitats that are affordable, maintainable, expandable, mobile, and self-sustaining. Concepts such as radiation shielding, energy management, temperature management, sound, lighting, psychology, and other common issues are included in this study. It will also describe ideas for both terrestrial low-impact communities and future space settlements with high degrees of independence.