

Abstract

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Architectural Concepts for Lunar Bases

Barbara Imhof

LIQUIFER, Grosse Mohrengasse 38/1, A-1020, Vienna, Austria
E-mail : bimhof@liquifer.at, Phone: ++4315880127022

Susmita Mohanty

MoonFront LLC, 550 Battery Street, Suite 1516, San Francisco, CA 94111, USA
E-mail : susmita.mohanty@moonfront.com, Phone: +1.415.773.0881

There is renewed international interest in returning to the Moon. Besides, USA, Japan, India and China, all of whom have near-term goals of sending orbiters and probes to the Moon, the European Space Agency (ESA) is preparing to send its first spacecraft, SMART-1 to the Moon in 2003. ESA has also introduced the Aurora Program to lay out a strategy for Europe's solar system exploration over the next 30 years, including manned expeditions to Moon and Mars.

Propelled by these interesting developments in Europe, an international consortium organized the first pan-European Lunar Base Design Workshop in June 2002. The objective of this Workshop was to blueprint extra-terrestrial bases for human and robotic exploration of the Moon. The first phase of this Workshop was hosted at ESA-ESTEC in Holland and second phase was hosted at the Vienna Technical University in Austria.

The Workshop participants chose diverse moon mission scenarios including ice mining, solar cell production, lunar telescopes, He3 mining, research and commercial operations. The paper will present the investigations and concepts relevant for a refined architectural approach from this Workshop. It will discuss the rationale behind adopting a multidisciplinary and multicultural design studio approach.

The paper will go on to discuss in detail 3 of the 9 concepts as Case Studies. The objective of these Case Studies will be to showcase three completely different architectural paradigms: (1) a mobile lunar base, (2) a habitat buried under lunar regolith, and (3) a stationary surface habitat. Each Case Study will feature an in-depth analysis addressing architectural issues such as modularity, transportation, construction, sustainability, human ecology, movement in partial gravity, and socio-psychological factors.