

Figure 1:

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Author: Mr. Madhu Thangavelu
University of Southern California, United States

Dr. James Burke
The Planetary Society, United States

ADVANCES IN MODULAR ASSEMBLY IN LOW EARTH ORBIT(MALEO) STRATEGY FOR LUNAR BASE DEVELOPMENT

Abstract

Advances in Modular Assembly in Low Earth Orbit(MALEO) Strategy for Lunar Base Development

Twenty five years ago, at the IAF in Bangalore, India, a concept to quickly establish an initial operational capability (IOC) lunar base was presented.[Figure 1] It was suggested that the entire complex be built at the International Space Station (at that time called Space Station Freedom, and still in design and engineering phase of execution) and after checkout, be transferred directly to the lunar surface from LEO employing appropriately fitted propulsion systems. Advantages cited included a lunar dust-free environment, experienced ISS personnel as assembly crew, and quick and prompt assistance from Earth, in case it became necessary.

Now, some quarter century later, this paper presents pertinent advances in space systems and human spaceflight, and how evolving technologies, infrastructure and operations today affect and transform the original MALEO strategy.

The MALEO strategy might still be the most economic way to jump-start human activities on the Moon, our closest celestial neighbor, that still remains the most pragmatic extraterrestrial surface to build up and extend our capabilities for long duration missions beyond Earth orbit. The MALEO cloning strategy, employing the ISS infrastructure as the assembly scaffold, can provide a solid stepping stone to operational stations in lunar orbit, on the lunar surface, and eventually human capabilities in deep space locations all over our solar system.

Figure 1. A three module MALEO configuration consists of habitation, laboratory and power modules that are assembled and certified at the International Space Station before being transported to the Moon employing special propulsion systems.