

Lunar Exploration (3)

Lunar Concepts (3)

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DESIGN AND CONSTRUCTION OF MANNED LUNAR BASE HABITATION

Abstract

Building manned lunar base is one of the core aims of human lunar exploration project, which is also an important way to carry out the exploitation and utilization of lunar in situ resources. The most important part of manned lunar base is the design and construction of living habitation and many factors should be considered including science objective and site selection. Through investigating and research, the scientific goals of manned lunar base should be status and characteristics ascertainment of lunar available in situ resources, then developing necessary scientific experiments and utilization of lunar in situ resources by using special environment conditions of lunar surface. The site selection strategy of manned lunar base should rely on scientific goals according to special lunar surface environment and engineering capacity constraints, meanwhile, consulting the landing sites of foreign unmanned and manned lunar exploration, and choosing different typical regions of lunar surface and analyzing the landform and physiognomy, reachability, thermal environment, sunlight condition, micro meteoroids protection and utilization of in situ resources, after these steps, a logical lunar living habitation site should be confirmed. This paper brings out and compares three kinds of configurations with fabricating processes of manned lunar base, including rigid module, flexible and construction module manned lunar base. 1The rigid habitation module is usually made by metal materials. The design and fabrication may consult the experience of space station, hence with mature technique. Because this configuration cannot be folded or deployed, which not only afford limit working and living room for astronauts, but also needs repetitious cargo transit between earth and moon for lunar base extending. 2 The flexible module habitation can be folded in fairing while launching. When deploying on moon, the configuration can be inflatable or mechanically-deployed, which means under the condition of the same volume it has less weight than rigid module, but based on durable, high hermetic, low density and elastic modulus advanced materials. 3The construction habitation has high expansibility and various configurations by using in situ resources as construction materials, but this technique is difficult to implement since it involves deep exploitation of lunar resources.