

SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)Author: Mr. Jason Kokotailo
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ISU MOON VILLAGE WORKSHOP - HABITAT DESIGN

Abstract

A lunar base is a hot topic in the space community and at agencies like the European Space Agency (ESA). The proposed presentation investigates the early stages for a lunar habitat design and simulation operation. The purpose is to build a primary base that would grow in a modular format over time and/or serve as a template for future habitats.

First, a robotic mission consisting of two robots will be sent to the Shackleton crater in south pole. The Shackleton crater has a permanently dark base, with ice, making the crater a privileged site for a permanent settlement. The robotic mission will take 6-8 months to excavate the tunnels using a plasma laser to cut. Both robots will be able to cut and excavate, providing redundancy in case of failure.

Second, a manned mission, consisting of 6 astronauts, will join the robots at Shackleton crater. The team will consist of at one-two doctors, one-two robotic engineers, and one-two material scientists. The rest of the team will be engineers. Prior to astronaut arrival 4 inflatable habitats will be shipped to the crater. The functional spaces will include living quarters, a manufacturing lab, a greenhouse and a reserve habitat in case of failure. The manufacturing lab's initial purpose will be to manufacture solar panels, followed by creating structural materials for habitat expansion and extracting hydrogen and oxygen for fuel. Finally, an air-locks system will be implemented between the four functional spaces and the outside.

This mission will use the site as an advantage for light by using concave mirrors at the top edge of the crater to reflect the sunlight to the inside of the habitat, providing heat and simulating a day of 12 hours of sunlight and 12 hours of darkness.