

22nd IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
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LUNAR ORBITAL PLATFORM-GATEWAY FUNCTIONALITY ENHANCED BY USING ADVANCED
SPACE MANUFACTURING SYSTEMS ASMS, (INC). SPACE UTILITY MODULE

Abstract

The Lunar Orbital Platform-Gateway (LOPG) functionality could be enhanced by docking with an ASMS Space Utility Module (SUM) which incorporates the International Docking System Standard (IDSS) and a set of airlock/double doors for delivery and placement of newer hardware equipment. Attaching the ASMS SUM with Airlock/Double-Door A/D-D access facilitates future space exploration and habitation environments by accommodating Earth-delivered tech/equipment.

The ASMS SUM is a cylindrical vessel, 7,620mm long with diameter 4,572mm, constructed with three layers of Kevlar, carbon fiber, and titanium from exterior to interior. It is equipped with a slidable platform on rollers to allow delivery of large pieces of hardware in-situ or on the surface of the Moon.

The A/D-D system is comprised of two sets of doors that are spaced approximately 1,016mm apart. The outer doors are semicircular in shape and encompass the complete outer diameter of the ASMS SUM. The outer doors are activated by a linear actuator which pushes the shaft of the door along a 254mm track. The track is made of titanium with spiral grooves along which the door spins 180 degrees, providing complete clearance for delivery of new equipment into the module. The outer doors have a unique shape to house the International Berthing and Docking Mechanism (IBDM). The right outer door holds the entire IBDM which protrudes past the center line of the SUM. The left outer door accommodates the protrusion, and the doors fit together tightly.

The inner doors are manually activated. They are mounted on an internal wall of the SUM and have a rounded-rectangular shape. The hinges are mounted on the inside wall and the inner face of the doors allowing for a complete seal between the wall and the doors. When opening the inner doors, the astronaut can swing the door out 100 degrees, giving complete clearance for the platform on rollers to slide in-out from the module.

Both outer-inner doors contain a standard-sized hatch for astronauts to move freely between modules without opening the larger doors. This allows the hatch to pull up away from any interference with platform changes. The tracks are two-part systems; the lower part of the track is attached at the face of the door while the upper part of the track is attached at the ceiling of the module. The ASMS SUM with double doors provides design flexibility for applications as Mfg. workshop, med-clinic, greenhouse fresh food.