

45th STUDENT CONFERENCE (E2)
Student Team Competition (3-GTS.4)

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NEXT EXPLORATION UNIVERSAL STATION (NEXUS)

Abstract

From July 25 to August 1, 2015 the Space Station Design Workshop (SSDW) was held at the University of Stuttgart in Germany with students coming from around the world. During the SSDW the participants were challenged to develop a concept for a new international platform like the International Space Station (ISS) for future space research.

This paper discuss the Preliminary Design Document of the architectural design, deployment strategy and operational phase of NEXUS: the Next EX-ploration Universal Station, an international crewed space platform in cis-lunar space to support the current vision for future deep space exploration. This station is designed to be modular, extensible, sustainable and serves a number of novel applications, including unique research, supporting current and future robotic and human planetary exploration, and providing a platform for international cooperation and commercial development. This space station will be the center of space exploration during its operation and will dramatically enhance the opportunities for every partner to explore the unknown and new locations beyond Low Earth Orbit. The world has successfully collaborated for many years at the ISS. However, the ISS is only currently supported through mid-2020s. The next step is to further the research and exploration done in space and provide an intermediate staging location for missions beyond Earths sphere of influence. NEXUS is located in cis-lunar space, in a halo orbit around the Earth-Moon Libration Point 2 (EML2). While the priorities of potential international partners are extremely varied, NEXUS location enhances and supports the vision of nearly every international space agency and commercial companies. The station offers numerous opportunities for research and technology testing in space and on the Moon.

The overall mission architecture is separated into two phases: the construction phase and the operations phase. In order to align with the end of the ISS, the construction will begin in 2024. The construction phase would last 6 years during which the various station modules are sent to EML2 using heavy lift launchers such as the SLS Block 1 and 1B through weak stability boundary trajectories. The station will become fully operational in 2030 and will receive supplies from Earth by using a solar electric tug which would taxi supplies from Earth to NEXUS. NEXUS will be used as an intermediate location for human and robotic missions to explore the Moon, Mars, and other destinations in our Solar System.

Keywords: space station, cis-lunar space, international, EML2, Moon.