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DEVELOPMENT UPDATE ON MODUL INTERPLANETARY TRANSPORT SYSTEM (M-ITS)

Abstract

In the next years humanity will be heading on a new Space Adventure. As a preparation for it, new systems and spacecraft are being developed. Most of them are focused on either surface-to-orbit or orbit-to-surface operations. Only a few concepts are looking into orbit-to-orbit transportation options. To fill this gap an Interplanetary Transport System is needed.

This paper offers an overview of the Modul Interplanetary Transport System (M-ITS) and the Modul spacecraft. What had started as an idea for a Mars Transportation system, has over 8 years of development evolved into a modular and fully reusable orbit-to-orbit transport spacecraft. Modul would operate in the Crew and Cargo variants, being able to transport astronauts, pressurized and unpressurized cargo. Additionally it could be used as a Space Station, Service Spacecraft or Test platform.

A modular design allows Modul to be easily adopted for missions' requirements, while remaining robust, safe and easy to maintain, repair and upgrade. Being a fully reusable modular orbital spacecraft minimizes refurbishment operations between missions, making the M-ITS system cost and time efficient. Furthermore, the compatibility with already established space infrastructure would result in working with already well tested platforms, lengthen their lifetime and eliminate the need for developing and establishing new ones.

Spacecraft design enables almost any mission within the Solar System. To maximize spacecraft's efficiency and use, two types of Modul are being proposed. First Generation Moduls would be used for Inner Solar System missions. Second Generation Moduls would head on the missions in the Outer Solar System. The M-ITS architecture offers an opportunity for the intermission and international collaboration and incorporates private companies into the system's architecture and spacecraft's design.

In addition paper presents updates on MIT-S's architecture, Modul's design and mission profiles that were implemented in the last year. The Tug module has been redesigned. Main features of the redesigned Tug module are larger fuel tanks and habitation volume and an addition of small deployable solar panels. It can either operate as Unmanned or Manned spacecraft. Beside used as an Airlock or as a Space Tug it can support crew of up to 5 astronauts on Short Duration and Surface Missions. Other updates include mass and payload capacity improvements of Modul's Cargo variants, changes in the chemical engines selection, addition of two new launch vehicles and adjustments in mission profiles.