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OPTIMIZATION OF MASS FOR A PRESSURIZED MODULE FOR CISLUNAR ORBIT

Abstract

Thanks to the ISS program, the European Space Agency and the contracted European Industries have matured valuable experience in the design of pressurized modules, including primary and secondary structures. Beyond Low Earth Orbit (LEO), the next step in international manned spaceflight cooperation is the Deep Space Gateway in Cislunar Orbit. One of the biggest technical challenges for this new endeavor is the mass at launch of the elements that compose the infrastructure. Therefore, mass optimization in the design of the DSG elements is mandatory.

This paper presents ideas of potential optimization of the design of the modules for the DSG, that in particular could be implemented in the design of an Habitable Module and give the attendant an idea of the technical areas that are currently being considered by ESA as areas where optimization can be achieved. The presented ideas cover technology development like lightweight structures, single loop active thermal control system, etc. The paper includes also ideas for the outfitting and architecture of the module in order to reduce its launch mass and ideas for mass optimization for a module designed to a Cislunar environment rather than a LEO environment.