IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Commercial Human Spaceflight Programmes (2)

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FEASABILITY STUDY OF A EUROPEAN COMMERCIAL SPACE STATION IN LOW EARTH ORBIT

Abstract

The design of a European commercial space station in Low Earth Orbit (LEO) is a topic of growing interest in the space community. Considering the future retirement of the ISS and the exponential growth of commercial interests, human establishment in the Low Earth Orbit will involve new actors. In particular, private companies are expected to play a leading role in this area because of the many potential business opportunities, such as space tourism and in-orbit manufacturing. In this scenario, the realization of an orbital space station will represent an opportunity to increase the technology readiness level and lay the basis for the future development of Space Science.

A potential architecture has been investigated within the framework of the 15th edition of the Second Level Specializing Master's Program in SpacE Exploration and Development Systems (SEEDS XV), which involved a group of students from Politecnico di Torino, ISAE-SUPAERO, and the University of Leicester, supported by experts from Thales Alenia Space Italy, ALTEC, the Italian Space Agency (ASI), and the European Space Agency (ESA).

This paper summarises the key concepts for the preliminary design of a European commercial space station in the Low Earth Orbit (LEO). Starting from the identification of mission requirements and design drivers, different technical solutions were investigated and traded off. A first sizing of the various subsystems is then provided, along with a thorough search for pioneering technologies that can be applied to the most critical systems, such as Life Support, MMOD protection, and radiation shielding. The referred space station would serve as a hub for various commercial activities in LEO, such as tourism, R&D and manufacturing, providing also the opportunity to implement advanced and innovative on-orbit operations, namely refuelling and maintenance services. Furthermore, the realization of this outpost would enable more opportunities for international cooperation, empowering the role of Europe in the global space industry.