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CHALLENGES IN LAUNCH, DEPLOYMENT, AND OPERATION OF SPACE STATIONS: A HISTORICAL REVIEW

Abstract

Since the beginning of the space era, space stations been a crucial role in maintaining human presence in space, expanding the horizon of human knowledge and catering to the human ingenuity. Being the complex marvel as they are their launch, deployment and sustained operation have been riddled with various difficult and arduous challenges. The Soviet Union's Salyut and the United States' Skylab were examples of early space stations that humans attempted to establish. Their limited supplies and erratic orbits caused problems, making it hard to guarantee the crew's health and safety. Later Space stations such as the Mir Space Station and the International Space Station (ISS) facing different yet severe hurdles, which included structural stability structural integrity, space debris, radiation exposure, and the necessity for continuous crew support systems. This paper investigates the main issues encountered over the operational lifespan of different previous space stations, along with the lessons learned and solutions deployed. The report also covers how different technologies are developing and how international cooperation is necessary to address a range of operational issues. The development of autonomous technologies, and the growing capacities of corporate and multinational space operations will help future space stations overcome challenges and eventually enable more ambitious missions to the Moon, Mars, and beyond.