Paper ID: 73310
student

IAF SPACE OPERATIONS SYMPOSIUM (B6)
Innovative Space Operations Concepts and Advanced Systems (2)

Author: Mr. Jaspreet Singh
University of Petroleum and Energy Studies, India, jaspreetsingh00@yahoo.com

Mr. Satyam Yadav
University of Petroleum and Energy Studies, India, satyamyadav1109@gmail.com
Mr. NEERAJ SEMWAL
University of Petroleum and Energy Studies, India, neerajsemwal8416@gmail.com
Mr. Pankaj Yadav
University of Petroleum and Energy Studies, India, yadavpankaj2245@gmail.com

DEVELOPING A SMALL-SIZED SERVICE STATION FOR PERFORMING REPAIRING AND MAINTENANCE OF SATELLITES

Abstract

For long time satellites have played a crucial role by providing a bird's eye view to observe a large area of Earth, helping various organizations to collect data and use it in efficient way. An average satellite lifetime is largely dependent upon how much fuel they have on board. Generally, the useful lifetime of geosynchronous orbit satellites observed average is only about 15 years due to the limited amount of propellant that is present in a particular quantity. This propellant is used for maintaining the satellite in the specific orbital slot and in orbit orientation which is also referred to as attitude. When the propellant is nearly exhausted, then notwithstanding that the satellite's other systems and payload are often in working order, the satellite comes to the end of its life and is moved to a "graveyard" orbital slot. Designing, manufacturing, launch, operations, and bringing a satellite to orbit and then operating can cost hundreds of millions of dollars. And yet, they only last 15 years or so; at this point, the onboard fuel is more or less depleted, and the satellite can no longer remain in its carefully-selected position. For solving this economical and technical problem and creating a sustainable solution, working on satellite life extension seems to be a feasible method. The purpose of the study is to design an orbit assembly aimed at repairing, maintaining, and refueling satellites in orbit thus increasing the lifespan of the satellite. This spacecraft module would be able to dock with an existing satellite. It will have two modules one is the parent module and another one is the service module. The parent module will be responsible for storing raw materials like propulsion fuel, solar cell arrays, etc. It will also contain a built-in lab, comprising of machines using advanced additive manufacturing or 3-D printing. The payload section will consist of the payload that needs to be replaced or serviced with the existing parts in a satellite that needs to be repaired. Since the parent module will be in-orbit with the service module so therefore there will be no need to send a mission-specific payload every time from the earth since the payload can be manufactured in the parent module using raw material thus saving a lot of money and time.