IAF SPACE SYSTEMS SYMPOSIUM (D1)
Lessons Learned in Space Systems: Achievements, Challenges, Best Practices, Standards. (5)

Author: Ms. Juhaina Khan
MDA Corporation, Canada

Mr. Rodney Hautot
MDA Corporation, Canada
Mr. Iqbal Kassam
MDA Robotics & Automation, Canada
Mr. Oneil D'Silva
MDA Robotics & Automation, Canada
Mr. Darin Buckland
MDA Corporation, Canada

EXTENDING THE LIFE OF THE MOBILE SERVICING SYSTEM (MSS) TO SUPPORT EXTENSION OF INTERNATIONAL SPACE STATION (ISS) OPERATIONS

Abstract

Having surpassed its intended ten-year service life, the Mobile Servicing System (MSS), including the Canadarm2 and Dextre, has been at the forefront of missions aboard the International Space Station (ISS) for almost two decades. Over the course of this time, the scope of the MSS Robotic Operations has steadily increased in type, length, frequency and complexity. MSS operations include maneuvering Crew and payloads to support on-orbit maintenance as well as capture, maneuvering, berthing and release of several space vehicles. The retirement of the Space Shuttle, changing space flight vehicles and interfaces, aging hardware, new science missions, and commercial payloads have all contributed to further opportunities and challenges for the MSS and those working to sustain it.

The company that designed and manufactured the MSS for the Canadian Space Agency, MDA Corporation, continues to support the MSS's on-orbit robotic capabilities, including real-time operations support. In doing so, MDA has developed safety critical space mission technologies, methods, and tools which enable building, maintaining, and upgrading space infrastructure. The technologies, methods, and tools developed by MDA help overcome new challenges that emerge. Challenges encountered over the life cycle range from adapting MSS spare provisioning approach to the evolving ISS logistics model, to planning novel robotic capabilities and operations to accommodate new payloads. One such challenge is to launch and fit large spare robotics through the newer ISS docking adapters, to deliver them to the ISS. Other ongoing challenges involve on-orbit anomalies, complex maneuver sequences, trajectory planning, and integration of new third party sub-systems and payloads to name a few.

The return to ground of flown hardware has provided data to inform our understanding of wear and tear associated with long term exposure of space mechanisms and electronics, allowing refinement of predictive models. The data from returned units has been important in tailoring how existing and future hardware is to be used and maintained on-orbit.

MDA frequently interfaces with ISS International Partners and payload providers in addition to the CSA and NASA in order for the MSS to offer unique solutions on the ISS. This paper will explore some of the challenges that MDA has overcome and the ways in which the MSS is able to achieve the expanded mission profiles which trending analyses show to be in increasing demand for the ISS.