SPACE OPERATIONS SYMPOSIUM (B6)
Human Spaceflight Operations Concepts (1)

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EVOLUTION OF KIBO(JEM)-RMS – CHALLENGE FOR GROUND CONTROL

Abstract

JEM Robotics Manipulator System(JEMRMS) was assembled to JEM Pressurized Module (JPM) and launched on Flight STS-124 1J in 2008. It has been used for several operations, such as handling JEM Logistic Module Exposed Section (JLE) or Exposed Payloads. These operations have often been conducted in proximity to various complex external features on JEM Exposed Facility (JEF); thus requiring great care. JEMRMS has been strictly designed to operate safely. Inadvertent arm motion or payload release, and uncontrolled arm movement may lead to damage of the ISS including e.g. collision with the grappled payload or the arm itself. JAXA has analyzed these hazards and identified several potential causes. JAXA has employed a two fault tolerant design to prevent such hazards. JEMRMS is designed to stop on: detection of a failure, prediction of a collision, or detection of an abnormal operating condition. JEMRMS operation concept consists of two parts. One is automated arm control, based on a well analyzed and verified arm path. The other is crew monitoring during arm motion. The crew can safely stop the JEMRMS arm anytime on detection of an anomaly. However, manual arm operation by crew was introduced in to save operation time. Consequently, the operation concept should be modified. In order to further minimize crew time, this year JAXA will implement a new JEMRMS function which will provide the ground control and reduce the requirement for crew intervention. Four demonstrations of this system will be performed. This new concept for the JEMRMS ground operation and an outline of the four demonstrations are presented.