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Author: Ms. Lyndsey Poynter  
MDA Space Missions, Canada, lyndsey.poynter@mdacorporation.com

Mr. Richard Rembala  
MDA Space Missions, Canada, richard.rembala@mdacorporation.com

Mr. Andrew Keenan  
Canadian Space Agency, Canada, andrew.keenan@asc-csa.gc.ca

Mr. Andrew Ogilvie  
MDA Space Missions, Canada, Andrew.Ogilvie@mdacorporation.com

Mr. Paul Fulford  
MDA, Canada, paul.fulford@mdacorporation.com

THE ADVANCEMENT OF ROBOTIC SERVICING CAPABILITIES THROUGH DEXTRE  
UTILIZATION AND TECHNOLOGY DEMONSTRATION ON THE INTERNATIONAL SPACE  
STATION

**Abstract**

Since Dextre's 2008 launch to the International Space Station (ISS), this next generation Canadian robotic system has not only demonstrated its planned ability to maintain and repair the aging space station but has continued to broaden its capabilities and applications. In addition to improving its utility to ISS by expanding and adapting Dextre to new devices and payloads that exceed its original design intent, Dextre has enabled the ISS to act as a test bed to evaluate a new generation of spaced-based instruments and robotic tools, along with operational techniques and the control strategies necessary for future on-orbit robotics and servicing missions.

This paper looks at Dextre's recent successes and MDA's efforts to expand on-orbit tele-robotic capabilities including the recent Goddard-CSA technology demonstration with the Robotic Refueling Mission (RRM) whereby Dextre successfully demonstrated the ability for ground operators to open triple-sealed wire-tied valves and transfer simulated propellant in January 2013. The application of the Dextre team's operations knowledge, simulation capabilities and ground test beds in verifying interfaces with the new devices and robotic payloads along with the development and validation of operational procedures for safe and successful on-orbit operations will be discussed. An overview of future technical demonstrations currently being planned will also be given summarizing the new challenges posed by these projects and the unique capabilities of Dextre and the rest of the Canada's Mobile Servicing System (MSS) in providing opportunities for such demonstrations.

The paper will also explore concepts for new potential applications for Dextre to benefit and support extended ISS operations such as increased automation, the incorporation of vision systems, additional robotic technology demonstration opportunities, as well as ideas for new tools for Dextre to perform such activities as non-destructive in-space structural inspection surveys of the ISS elements and visiting vehicles.