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MOSAR-WM: INTEGRATION AND TESTS RESULTS OF A RELOCATABLE ROBOTIC ARM
DEMONSTRATOR FOR FUTURE ON-ORBIT SERVICING MISSIONS**Abstract**

Existing commercial satellites and space platforms are traditionally the result of a customized monolithic design with very limited or no capability of servicing and maintenance. To increase these capabilities while remaining cost effective, high performing, reliable, scalable and flexible, key technologies need to be developed. Versatile and advanced robotic systems can be considered currently as one of these key enablers, opening a new horizon of possibilities to facilitate this fundamental shift of paradigm in designing and deploying satellites and spacecraft. This paper deals with such a robotic system called MOSAR-WM. MOSAR-WM is a robotic manipulator, aka. "walking" capable, developed in the context of the European Commission's Space Robotic H2020 MOSAR project. This robotic system aims at installing and releasing satellites modules (from servicer to client spacecraft and inversely). It also has the capability to relocate itself over the spacecraft structure in order to perform tasks at different location. To do so, MOSAR-WM features 7 degree of freedom (DOF), a symmetrical and anthropomorphic kinematics, and standard interconnects at each tip for mechanical, data and power connections to the spacecraft. It also embeds its own power and data avionics as well as servo and robot control units. Within the H2020 MOSAR project, a Technology Readiness Level (TRL) 4 ground demonstrator of MOSAR-WM has been developed, built and tested. The overall length of the robotic arm is 1.6 meters for an approximate weight of 30kg and has a lifting capability of 10-kg payloads at 1g in its entire workspace. This paper described in detail the manufacturing, assembly, integration and testing (MAIT) activities related to the development of such a relocatable robotic arm, as well as the demonstration results and lesson learned. The results are also discussed in relation with the design choices, covering mechanical, avionics, sensors, actuators and control

aspects.