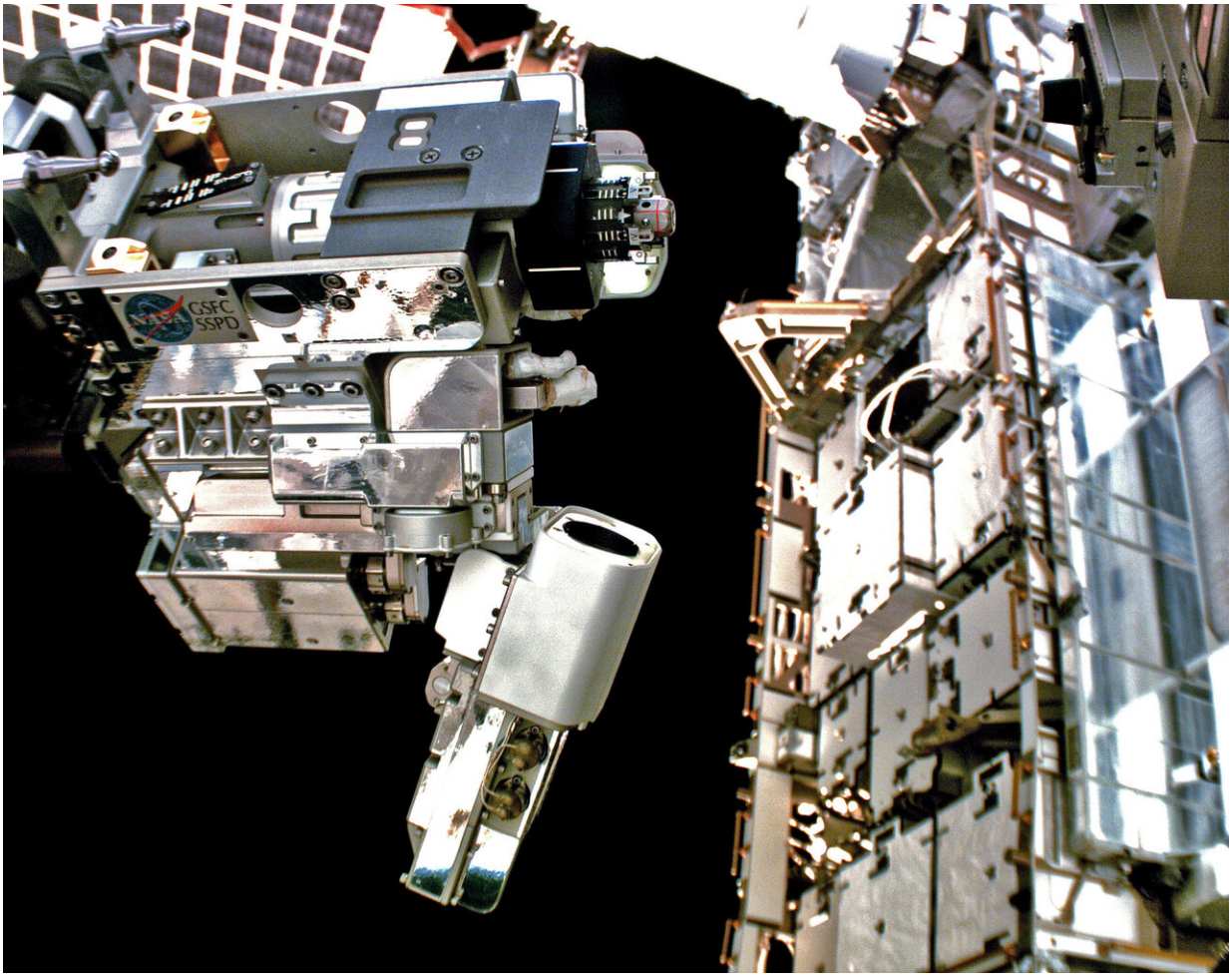
Robotic tool operations bring in-space refueling closer to reality

August 19 2019, by Vanessa Lloyd And Peter Jacobs



Robotic Refueling Mission 3's Multi-Function Tool 2, operated by Dextre, demonstrates robotic refueling operations on the outside of space station. Credit: NASA

NASA's Robotic Refueling Mission 3 (RRM3) completed an initial set of tool operations, bringing the idea of using water ice or methane from other worlds as fuel for spacecraft one step closer to reality. The ability to store and transfer cryogens (super-cold hydrogen, oxygen and methane) will help spacecraft journey father into our solar system and beyond.

The successful operations demonstrated the first of three tools designed by the Satellite Servicing Projects Division to robotically transfer liquid methane from one tank to another in space. Operated by space station's Dextre robot, the Multi-function Tool 2 unstowed the cryogen coupler adapter and inserted it into the cryogen coupler adapter port. This operation would make it possible to then transfer cryogenic fuel using the remaining RRM3 tools. Additional RRM3 tool operations will be carried out later this year.

RRM3 launched to the International Space Station in December 2018. While the mission is no longer capable of transferring liquid methane due to a hardware issue in April, it has achieved several objectives. RRM3 demonstrated the longest storage of a cryogen without loss due to a process called boil off. Boil off is a loss of fluid that occurs when the cryogen is not maintained at a low enough temperature. Special coolers within RRM3 kept the liquid cold for four months.

The RRM3 team manages operations from the Goddard Satellite Servicing Control Center at NASA's Goddard Space Flight Center in Greenbelt, MD. Credit: NASA/Taylor Mickal

Provided by NASA's Goddard Space Flight Center