Building on Canadian Capabilities for Space Resource Missions

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Abstract

Canada has extensive and world-renowned expertise in Earth-based science and the exploration and extraction of natural resources. Canada also has broad and world renowned experience in space science and technology, mission architecture and, space systems design. Since becoming the third nation in space in 1962, Canada has been combining the commercial/industrial sectors with the space sector and producing world class capabilities exploring space. A logical next step is to combine these areas of expertise and participate in space resource-based missions.

Canada's space industry has co-developed and collaborated with the commercial sector during programs such as the Shuttle Remote Manipulator System (Canadarm), taking terrestrial technologies through detailed design and rigorous test cycles in preparation for flight. Commercial EEE parts, processors, sensors, motors, brakes, gears, clutches, lubricants were co-developed and/or space qualified.

Recent collaboration in space exploration between academia, commercial and space sectors include sensor development for the Mars Phoenix Meteorological Station and the Mars Science Laboratory Alpha Particle X-Ray Spectrometer onboard the Curiosity rover have taken Canadian developed systems from low earth orbit to Mars. A Canadian team is currently under contract working on OSIRIS REx, an asteroid sample return mission providing scanning/rendezvous sensors. Scientists from across Canada have teamed with the commercial and space sectors throughout in building our capabilities.

For decades Canadian teams have been researching and developing technologies and gaining experience surrounding in-situ resource utilization, roving and mobility systems, sensors, autonomy, and analogue operations all with the goal of supporting future missions to the Moon, Mars and nearby asteroids. Our readiness level continues to evolve, positioning us well as a nation for exploration beyond earth orbit, expanded space infrastructure and a new level of space resource utilization.