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CREWED LUNAR LANDING MISSION CAMPAIGN FROM THE GATEWAY

Abstract

Lockheed Martin has an extensive history in designing, building, and operating spacecraft and landers for deep space applications, from the first successful Mars lander mission by Viking I in 1976, to currently studying the planet's interior structure by Insight. Serving as the primary contractor of Orion and one of six companies participating in the NextSTEP-2 contract for developing the Gateway, Lockheed Martin is working closely with NASA, the international aerospace community, and the commercial industry to develop an optimal architecture for supporting humans at the Moon. The Gateway would be positioned in the vicinity of the Moon and is the key piece of infrastructure that enables reusable lunar landers and achieves sustainable exploration of any location on its surface. Having been selected as one of nine companies to serve in the Commercial Lunar Payload Services (CLPS) program, Lockheed Martin is ready to begin delivering lunar science and commercial payloads to the Moon. Deep space human exploration requires a unique set of advanced, flight-proven systems, with the crew and vehicle operating in autonomy. NASA has announced a Human Landing System (HLS) architecture and is planning missions from the Gateway, starting in 2024 and transporting astronauts to the Moon's surface in 2028. This paper will describe a proposed early mission campaign for crewed landings, including those objectives focused on science, exploration, and technology development. Beyond the major contributions of the crewed landing missions, a lunar infrastructure comprised of CLPS, Orion, SLS, Gateway, HLS, and various logistics vehicles opens a whole new set of opportunities for secondary science, commercial payloads, and exploration for expansion into deep space. Last year, Lockheed Martin presented a reusable, singlestage lander design, an initial concept for delivering humans to the lunar surface and precursor to the Mars Base Camp Mars Ascent Descent Vehicle. This year, a multi-stage lunar lander concept will be described, one that leverages Lockheed Martin's human-class spacecraft and deep space vehicle design and development experience. Those investments made especially in Orion and interplanetary spacecraft will drive significant reductions in the cost, complexity and development timeline associated with new crewed vehicles. Through the combination of flight-proven design and ongoing advancements in deep

space systems, Lockheed Martin looks to be a key promoter and enabler for transitioning humankind from low-Earth orbit to the Moon, with the ultimate goal of achieving crewed exploration of Mars.