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Author: Mr. Andrew Crocker
Dynetics, United States, andy.crocker@dynetics.com

DYNETICS HUMAN LANDING SYSTEM: OVERVIEW AND STATUS OF THE LUNAR SPACE TRANSPORTATION SYSTEM

Abstract

Dynetics, Inc. (Dynetics) leads a team of experienced industry partners to build a Human Landing System to safely ferry astronauts, including the first American woman, to areas of the Moon never explored before and back, preparing for a sustainable human presence on the Moon. The Dynetics Human Landing System (DHLS) design meets and, in many cases, exceeds NASA's initial technical and schedule requirements for early human landings and also offers near-term reusability and sustainability to provide a robust lander capability. DHLS can be the backbone of a sustainable lunar exploration program that establishes a sustained presence off the Earth and builds the capabilities for human missions to Mars and deep space.

The central element of the DHLS is called the Descent/Ascent Element (DAE). The DAE functionally consists of a Crew Module (CM), which provides a safe crew living and working environment, and the Autonomous Logistics Platform for All-Moon Cargo Access (ALPACA), which contains propulsion; landing and docking; vehicle management; guidance, navigation, and control (GNC); power; communications; and thermal control. The ALPACA uses liquid oxygen/liquid methane (LOX/LCH4) propellants for a high-performance, compact vehicle. For uncrewed missions, the CM may be replaced by other large payloads that can be carried to the lunar surface and/or to other cis-lunar destinations.

Dynetics' design is focused on crew safety and mission success. A low-slung CM allows direct surface access for crew, payloads, and equipment without the use of tall ladders or the complexity of elevators, cranes, or robotics. It can also support many other missions beyond crew transport. It can place payloads directly onto the lunar surface without cranes or other infrastructure. Alternatively, it can pick up cargo from the surface for transport to lunar orbit. DHLS could be a central element for a propellant depot on or near the Moon. Dynetics is also designing its system to be reusable from the start, with only minor design changes needed from the first to later versions to enable full system reusability. This paper will provide an overview of the DHLS and a status of its development.

Please note that many more technical and programmatic details will be provided in the manuscript and during the presentation.