SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Heavy lift launchers capabilities and new missions (8)

Author: Mr. Martin McLaughlin
Northrop Grumman Corporation, United States, martin.mclaughlin@ngc.com

Mr. Berry Jim
Northrop Grumman Corporation, United States, Jim.berry@ngc.com
Mr. Ken Rourke
Northrop Grumman Corporation, United States, ken.rourke@ngc.com
Mr. Nathan Oldfield
Northrop Grumman Corporation, United States, nathan.oldfield@ngc.com

SUSTAINABLE HEAVY LIFT VEHICLE DEVELOPMENT OPTIONS

Abstract

The development of a sustainable heavy lift vehicle is the most critical project for space exploration beyond Earth Orbit. Current launch vehicles do not have sufficient payload mass and volume to Earth escape necessary for acceptable mission reliability. Many other critical developments are required including in-space propulsion, radiation protection and others, but sustainable heavy lift capability is the necessary foundation. Sustainable heavy lift development is especially difficult due to funding limitations in a struggling world economy, low mission rates, multiple uncertain missions and legacy system closeout. Difficult as this development is, it cannot consume all available resources stifling other critical developments and near term exploration missions. We believe sustainable heavy lift requires; incremental development, low fixed costs and flexibility for a wide variety of missions. Funding profiles are flat with very limited ability to absorb non-recurring spikes and stretched out development adds costs and inhibits progress. Incremental development can fit under funding profiles and enables near term exploration with a growth path. Low mission rate, flexible missions and long system life make it difficult to offset development investments and support production and operations infrastructure. This drives a compelling need for low fixed costs that must be a major consideration for the vehicle configuration and during all phases of development. The exploration architecture and launch needs will continue to evolve for decades. The heavy lift system needs to be flexible for currently unknown exploration missions and be available for science, space servicing and other user missions. Sustainable heavy lift vehicle concepts covering the available design space are presented along with incremental growth development roadmaps.