

SYMPOSIUM ON STEPPING STONES TO THE FUTURE: STRATEGIES, ARCHITECTURES,
CONCEPTS AND TECHNOLOGIES (D3)

Strategies and Architectures to Establish a “Stepping Stone” Approach to our Future in Space (1)

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A NEAR-TERM APPROACH TO LUNAR MAGLEV LAUNCH: ENABLING
LUNAR-MANUFACTURED SYSTEMS AT AN AFFORDABLE PRICE

Abstract

The eventual commercial development of extraterrestrial materials into the economic activities of humanity will depend upon a range of key new capabilities, ranging from in situ resource utilization (ISRU) to highly autonomous space systems. There is no capability, however, that is of greater importance than that of affordable and timely transportation of extraterrestrial products to remote destinations. For example, low cost transportation of lunar surface-manufactured consumables and systems elements from the Moon to geostationary Earth orbit (GEO) will be essential to the insertion of such products into any future space solar power economy.

This paper presents a detailed description of a new approach to achieving low-cost lunar maglev launch, as well as the results of preliminary systems analysis studies of the concept. The paper argues that lunar maglev launch is one of the most promising concepts for economically-viable lunar materials utilizations, and that presents a roadmap for the near-term validation of key concepts and technologies to achieve affordable lunar maglev launch, and the development and deployment of initial operational systems. Specific figures-of-merit are presented that would enable such a system to become economically viable, and technical objectives for key systems elements are presented. The paper concludes with observations regarding the future of such an approach, and describes a prospective roadmap for their development.