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STUDY FOR THE APPLICATION OF RAILWAYS AND SPACECRAFT CATAPULTS AS LUNAR
TRANSPORTATION SYSTEMS

Abstract

Global demand for transport on Earth is growing fast. On the other hand, with the upcoming missions to the Moon like the Artemis program and ESA's Moon village, such a demand for transportation will eventually arise for Lunar exploitation. Yet, while Lunar roving vehicles are the only vehicle tested on the Moon, they have not been designed to transport a considerable amount of goods. As a result, studies have been carried out to design new transportation systems that can be used on the Earth's natural satellite, based in the already existing railway and aircraft catapult systems.

Vacuum and low gravity create a near-frictionless environment in which rails can serve as an alternative to carry equipment and astronauts, as well as a suitable spacecraft launching pad. To achieve the adaptation of the selected systems to the Lunar environment, the technical specifications and working principles are investigated, defining the possible advantages related to the Moon's aforementioned characteristics. Coupled with the requirements for the connection of known relevant Lunar surface sites, such as the South pole, and a future need of frequent and cost-effective launch capabilities, the possibility of catapult and train utilization is studied.

This paper results in a feasibility study for the application of catapults and railways as potential Lunar

transportation methods, based on the current knowledge about their use and the undergone development for Earth.