

14th HUMAN EXPLORATION OF THE MOON AND MARS SYMPOSIUM (A5)
Near Term Strategies for Lunar Surface Infrastructure (1)

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ACCESSING IN-SITU RESOURCES

Abstract

Lunar regolith can be used in a multitude of applications ranging from raw material extraction to radiation shielding for proposed structures. Lunar in-situ resource utilization (ISRU) will depend on the ability to effectively excavate and manipulate the moons most plentiful resources, the lunar regolith. The development of excavation equipment for lunar operations is still in development. Terrestrially, excavation equipment depends on size and mass of the machine to perform its operations. In the lunar environment, this may not be possible due to transportation and cost constraints for a machine based on this design. One potential solution to reduce the size and mass needed for lunar excavation equipment is to reduce the excavation force required for an excavation blade to penetrate the lunar surface. This can be accomplished by use of a percussive mechanism in conjunction with the excavation blade.

A prototype lunar excavation system, designed for the purpose of leveling the lunar surface, has been in development over the past two years at Rutgers University. A leveling system may prove useful as the first stage in preparation for laying the foundation for long term lunar structures or as preparation for sintering the surface for dust mitigation reasons. This presentation will explain the design of the system and elaborate on the analysis of the percussive system utilized. Uncertainty analysis is performed and comparisons between the effectiveness of the system in the lunar environment as well as the terrestrial test environment will be discussed.