Picturing the future – Assessment of the excavation systems for lunar mining

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ABSTRACT

There's global attention surrounding the prospect of lunar mining and the opportunities it offers to advance space exploration. The current focus encompasses ice and other volatiles that offer the possibility of in situ rocket fuels, as well as oxygen and liquid water that can provide essential life support. Consequently, the large concentrations of lunar ice collected in craters are of particular interest within the industry. Concepts have been proposed to retrieve these materials, but no system has yet been designed to address all the harsh conditions that come along with off-earth mining. Successful systems must consider a variety of challenges, including excavation location and depth, power, reliability and equipment maintenance, material handling and external environmental factors. This study, therefore, will focus on the evaluation of excavation systems that may be suitable for the lunar environment, addressing these barriers. The outcome of this paper can contribute to the future development of a system for which lunar mining can be considered in a feasible and practical manner, and will provide insights into the off earth mining decision making from a new perspective.