

Testing and Application of Regolith Parts, Produced by Additive Manufacturing Technologies

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Introduction:

Additive Manufacturing, and the use of AM technologies on the lunar surface is currently an ongoing, active field of research. Examples of AM technologies include direct microwave sintering of the lunar surface [1], and the extrusion of polymer composite concretes [2]. Many lunar AM technologies have been designed for construction applications, primarily to produce habitats, or landing pads. At a more industrial level however, Outward Technologies has developed a Solar Additive Manufacturing system (SAM) that enables production of small-scale regolith parts to be manufactured with in-situ material [3]. SAM parts have been designed for use in infrastructure development as well as for construction projects. Throughout 2022, several lab-scale experiments were conducted to determine the strength of SAM printed parts, in addition to identifying potential applications for small components, such as grousers, truss members, and bricks [4]. Examples of SAM parts, physical testing results and demonstrations of SAM specific modeling techniques were compiled in November of 2022. Results from testing illustrate how the Outward Technologies SAM system greatly advances current lunar in-situ AM capabilities.

References:

[1] Taylor, L. A. and Meek, T. T. (2005) *Journal of Aerospace Engineering*, Vol. 18, Issue 3 [2] Lee, T. S. et al. (2015) *Acta Astronautica*, Vol. 114, pp. 60-64. [3] Taylor, L. A. et al. (2016) *Planetary and Space Science*, Vol. 126, pp. 1-7. [4] Romo, R. et al. (2018) *ASCE, Earth and Space 2018*, pp. 298-96

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