Moon-Opoly II: Employing Additive Manufacturing Technology for Lunar Construction With Waterless Concrete

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NASA has near-term plans to return to the moon with the intention of creating a permanent colony - they call it The Artemis Project. Creating a suitable building material using only the resources available on the moon will be critical to maintaining a colony there. In last year’s Science Fair, I focused on developing a type of waterless lunar concrete using Lunar Regolith and Elemental Sulfur, two materials that are abundant on the moon. I participated in the Materials Science category. This year, my project in the Engineering category revolved around how to put this “Lunar-Crete” to work, specifically by using 3D printer technology to extrude the material into useful shapes. It began with a question: Could one accurately and reliably 3D print a structure on the Moon, using waterless concrete (Lunar-Crete) as the base material? The question turned into a goal: To design and build an extruder nozzle that would allow for the 3D printing of waterless concrete, and to test the compression strength of the resultant output in a commercial materials testing lab and compare it to last year's waterless concrete compression testing results. In the end, I was able to extrude samples of Lunar-Crete using this novel extruder, although after multiple tries the samples I created were not sufficient for compression testing in a Commercial Lab, based on my testing experience from last year. In conclusion, this year’s 3D extruder project demonstrates that there may be a way to accurately create objects with Lunar-Crete. I do see extruded Lunar-Crete as being the future for simple construction on the moon.

Awards Won: