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SETTING UP A LUNAR DUST 3D SOLAR PRINTER IN COLLABORATION WITH ECAM STRASBOURG

IMPROVEMENTS OF THE 3D SOLAR PRINTER AND ITS CAPABILITIES IN COMPARISON WITH OTHER ADDITIVE MANUFACTURING TECHNOLOGIES

Abstract

With the novel peak of space exploration, the incentive is to focus on research that will bring benefits both to humanity and interstellar travel. That will help to further spread human consciousness whilst exploring and populating other celestial bodies. In this paper, the feasibility of 3D Solar Printing and utilization of various lunar soil simulants are examined. The same working principles that were known for normal 3D printing will be applied in this case, but with a different power source, the Sun, and the sand will be its initial material. The scope of this research is to upgrade and optimize the preexisting 3D Solar Printer, a created prototype through a cross-collaboration of the International Space University (ISU) and ECAM Strasbourg-Europe. The primary objective was to produce 3D printed samples that can be simple at first trials but then it was developed in complex shapes. The final envisioned goal was 3D printed bricks firstly of sand followed by lunar regolith simulants LHS-1, LMS-1, and EAC-1. Whilst continuously perfecting the machine and upgrading it, its performance was compared with other additive manufacturing technologies such as Selective Laser Sintering. The best parametric combination of material and printer characteristics such as power, speed, and layer thicknesses, hypotheses how potential use of 3D Solar Printing might be beneficial to settle the Moon.