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MULTI-MATERIAL 3D PRINTING OF A MAGNETRON

Abstract

Solar Power Satellites face the challenge of extremely high production costs as they require several launches for space-based assembly. 3D printing the parts of Solar Power Satellites in space can reduce these launch costs drastically. The main issue arises when attempting to 3D print technological components such as the cavity magnetron. This paper showcases a method for 3D printing a magnetron using conductive materials. The method specifically shows how each part of the cavity magnetron is modelled, printed, and assembled. The testing and operation of the fully constructed cavity magnetron is also discussed. The initial iteration uses copper due to its high electrical and thermal conductivity required for the operation of the magnetron. Further iterations of the magnetron are printed in materials that can be obtained from a lunar environment such as aluminium. This paper examines the feasibility of 3D printing the components of a cavity magnetron for use in Solar Power Satellites, as well as the possibility of using lunar materials for 3D printing.