

IAF SPACE PROPULSION SYMPOSIUM (C4)  
Propulsion System (1) (1)

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TESTING AND VALIDATION OF A PROTOTYPE 3D PRINTED LIQUID BI-PROPELLANT  
ROCKET ENGINE**Abstract**

The Portland State Aerospace Society (PSAS) has set out to build a 100km capable liquid bi-propellant amateur rocket. The rocket will be propelled by an open-source, parametrically modeled, and regeneratively cooled engine designed for use with liquid oxygen and isopropanol. A 3d printed, half scale 500lbf (2.2kN) thrust engine was used for testing and design validation. In this paper we discuss the design, testing, and analysis. Engine testing methods discussed include the use of computer tomography (CT scanning) to locate defects from the DMLS print process, the effect of print finishing on the fluid characteristics of the engine, post-processing and cleaning of a DMLS printed engine, injector design and manufacture, effects of foreign object debris on injector performance, and pintle injector performance analysis. Further topics will include test stand design, automation of critical systems, and data acquisition.