

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

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AN ADDITIVELY-MANUFACTURED CNG/GOX AEROSPIKE ROCKET ENGINE: DESIGN  
PROCESS**Abstract**

A 4kN aerospike rocket engine was designed to be produced using additive manufacturing via the selective laser melting (SLM) technique. This process, along with use of the high temperature Nickel alloy, Hastelloy X, allowed for unique design decisions for the rocket engine.

In addition to the central rod support of the aerospike plug, the surrounding spherical body was separated into three combustion chambers. The cooling of each chamber and the central plug was incorporated directly, with coolant channels integrated into the combustion chamber walls. This allowed for the rocket engine to be comprised of only two parts; the aerospike and central rod, and the combustion chambers and cooling jacket, a feat unobtainable with traditional manufacturing techniques.

The presentation will focus on the novel design process of the additively manufactured engine, from inception to final product. The success of the hot fire test will inform a discussion of the applicability of additive manufacturing for rocket engine design.