MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Advancements in Materials Applications and Rapid Prototyping (9)

Author: Mr. Sebastian Grau
Technische Universität Berlin, Germany

Mr. Daniel Noack
Technische Universität Berlin, Germany
Prof. Klaus Brieß
Technische Universität Berlin, Germany

RAPID PROTOTYPING OF A COMBINED CHANNEL/PUMP STRUCTURE FOR LIQUID METAL ACTUATORS USED AS ANGULAR MOMENTUM STORAGE DEVICE FOR PICOSATELLITES

Abstract

Liquid metal actuators–used as angular momentum storage devices–require a ring-like channel to conduct the liquid metal, and a housing for an electromagnetic pumping unit. Due to the small scale required for Cubesat application, rapid prototyping technologies are used to produce an integrated channel/pump element.

Selective laser sintering enables hollowed channel structures with an inner cross-section in the milimeter area. At the same time, all structural features required for housing the pumping unit can be added to the channel.

Sintered structures are currently used in laboratory models of liquid metal actuators. This paper describes the design process of the channel/pump element, powder removal from the channel, and surface treatment of the inner walls of channel and pump.