

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)

Advancements in Materials Applications, Additive Manufacturing, and Rapid Prototyping Manufacturing
and Rapid Prototyping (8)

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LASER POWDER BED FUSION FOR OPTO-MECHANICAL FLIGHT HARDWARE ON SATELLITES

Abstract

Advancements in materials and manufacturing technologies provide new possibilities for spacecraft design. Within the last decade, Additive Manufacturing evolved from a technology merely used for Rapid Prototyping into different reliable manufacturing processes. Today, especially Laser Powder Bed Fusion can be regarded as a mature technology that enables innovative design concepts with an exceptional freedom of design.

OHB follows a proactive approach to identify new manufacturing technologies for future satellite platforms and payloads. Design and optimization capabilities were established to apply L-PBF as an alternative to traditional manufacturing technologies. Potential applications in aluminum and titanium were identified in the opto-mechanical domain that imply benefits regarding optical performance, mass reduction or consolidation of parts to ease its alignment, assembly, and integration.

In the paper, opto-mechanical flight hardware is presented that was recently developed for different earth observation missions. The design process is shown exemplarily for a complex optical bench, a straylight baffle with internal vanes and mirror with embedded lattice structures. Key challenges during the design, manufacturing, and post-processing are addressed. The presentation features on requirements for process and flight hardware verification following the standard of the European Cooperation for Space Standardization (ECSS).

In a nutshell, the audience will understand OHB's motivation to apply L-PBF for opto-mechanical space applications and its innovative potential. The recently developed flight hardware illustrates the advantages of the technology compared to conventional solutions.