

## **The Effect of Hot Isostatic Pressing on surface integrity, microstructure and strength of hybrid MIM/PBF stainless steel components**

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Hybrid manufacture of components by combining capabilities of replication and Additive Manufacturing processes offer a flexible and sustainable route for producing cost-effectively small batches of metal parts. At present, there are open issues related to surface integrity and performance of such parts, especially when utilising them in safety critical applications. The research presented in this paper investigates the ductility amplification of hybrid components produced by using Metal Injection Moulding preforms and then build on them customisable sections by Laser-based Powder Bed Fusion. The properties of such hybrid components are studied and optimised through the use of non-conventional post treatment techniques. In particular, Hot Isostatic Pressing (HIP) is employed to improve mechanical strength and to produce hybrid components that have consistent properties across batches and throughout the samples, minimising microstructural heterogeneities between fabrication processes. Thus, the investigated post-processing method can extend the service life of hybrid components, especially when operating under severe conditions. The optimised post treatment was found to increase the hybrid components' strength compared to as-built ones by 67.8 % and ~11% in YS and UTS, respectively. Which subsequently led to a greater pitting resistance; thus, making HIP samples more suitable for corrosive environments. The advantages of the HIP treatments in comparison to the conventional heat-treatment of hybrid components are discussed and also some potential application areas are proposed.