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Procedia CIRP 00 (2021) 000–000

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54th CIRP Conference on Manufacturing Systems

Effects of Mechanical Post-Treatments on Additive Manufactured 17-4PH Stainless Steel Produced by Bound Powder Extrusion

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Abstract

Bound Powder Extrusion (BPE) is increasingly gaining popularity and makes metal additive manufacturing easier and more accessible for industrial production. The Markforged-Metal X technology with debinding and sintering, also called Atomic Diffusion Additive Manufacturing (ADAM), is a newcomer in the field of extrusion additive manufacturing. The main objective of this work is to investigate the mechanical properties of 17-4PH stainless steel samples produced by ADAM. Moreover, the effects of a mechanical post-treatment (SMAT) on surface and mechanical properties are also analyzed. The macroscopic tensile response and superficial residual stresses of as-fabricated and SMATed samples are compared.

Keywords: 17-4PH SS; Bound Powder Extrusion; Post-treatment; SMAT; Roughness; Residual stresses