



3-7 JULY 2023

HERAKLION, CRETE | GREECE

ACEX2023

16th International Conference on Advanced
Computational Engineering and Experimenting

ABSTRACT:

Direct Ink Writing of metallic structures

L. Biasetto^{1, a}, V. Gastaldi²

¹Università di Padova, Dipartimento di Tecnica e Gestione dei Sistemi Industriali,
Stradella San Nicola 3, 36100 Vicenza-Italy

²Università di Padova, Dipartimento di Ingegneria Industriale, Via Marzolo 9, 35131 Padova-Italy
alisa.biasetto@unipd.it

Keywords: Direct Ink Writing, AISI316L, Ti6Al4V, Cu.

Extrusion based additive manufacturing technologies (Direct Ink Writing and Fused Deposition Modeling) to produce metallic components is an interesting class of process compared to energy-based ones, since they offer more flexibility in terms of printable materials, and they overcome the limitations of process induced anisotropy [1]. The main drawback can be related to the binder removal and sintering. The development of inks to be used in Direct Ink Writing represent one of the main challenges associated to the control of the inks' rheological properties and the control of the shape of the printed part, especially if the shape is complicated as in the case of 3D scaffolds and auxetic structures [2]. In this work we will present the properties of different metallic inks (i.e. Ti6Al4V, Cu, AISI316L) and how their composition in terms of powder over binder volume ratio, binder composition and powder size distribution affect the printability and the quality of the printed part. Examples of structures will be presented, so as their microstructural and mechanical characterization.

[1] M.A. S. R. Saadi et al. Direct ink writing. A 3D printing technology for Diverse Materials, Adv. Mater. 2022, 2108855

[2] L. Biasetto, H. Elsayed Direct Ink Writing of AISI 316L dense parts and porous lattices, Adv MAT Eng. 2022, 2101729