

MATERIALS SCIENCE AND TECHNOLOGY

MUR DM 117/CIM 4.0 - Energy efficiency of additive manufacturing technologies

Funded By	COMPETENCE INDUSTRY MANUFACTURING 4.0 Ministero dell'Università e della Ricerca - MUR [P.iva/CF:96446770586] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	Metallic complex-shape components can be produced by Additive Manufacturing technologies. These processes allow to produce small-medium parts for automotive, aerospace, biomedical, etc.. fields. In view of the industrial application of additive manufacturing technologies is important to minimize production time, starting materials amount, emissions and wastes volumes. The process parameters of the most appropriate additive manufacturing process will be defined for reaching high density and specific mechanical performances in processed materials. The optimization of the performances of the final parts will involves also the definition of heat treatments for the optimization of mechanical behavior. A global energy efficiency approach will be developed, balancing process and post-processing conditions for reaching the best balance between component features and energy consumption. Progetto finanziato nell'ambito del PNRR – DM 117/2023 - CUP E14D23002060004
Objectives	The main research objectives of this PhD thesis includes: - o Characterization of metallic powders for additive manufacturing. - o Process optimization for additive manufacturing of metal alloys or composites. - o Study of material microstructures, physical, functional and mechanical properties, defining their influence on mechanical and functional performances of final components. - o Study and optimization of post-processing heat treatments, defining their influence on mechanical and functional performances of final components. - o Energy efficiency evaluations of additive manufacturing chain.

**Skills and
competencies
for the
development of
the activity**

Candidates should have a solid engineering background and strong motivation to learn through advanced research.
Expertise in materials science, advanced processes and technologies, mechanical behavior and characterization of metallic materials is a plus.
Problem solving ability and practical attitude for the design of additive manufacturing parts is also appreciated.