



## THEMATIC SYMPOSIUM: 1st Announcement

### DEFECTS IN ADDITIVE MANUFACTURED MATERIALS AND THEIR EFFECT ON FRACTURE AND FATIGUE PERFORMANCE

The revolution of Additive Manufacturing (AM) is reshaping the landscape of materials engineering and industrial production, offering unprecedented opportunities for creating complex, lightweight, and highly customized components. However, while AM opens new frontiers in design and innovation, it also introduces significant challenges, including the intrinsic defects that can compromise the mechanical performance of materials, particularly regarding fracture and fatigue.

To delve deeper into this critical topic, we are pleased to announce the **Thematic Symposium entitled “Defects in Additive Manufactured materials and their effect on fracture and fatigue Performance”**. This event represents a unique opportunity to bring together researchers, engineers, industry professionals, and students to discuss challenges, scientific advancements, and innovative solutions related to defects in AM materials. The symposium will be chaired by Sabrina Vantadori and Filippo Berto.

#### Key topics

The symposium will cover a wide range of theoretical, experimental, and applied aspects, including:

**Origin and types of defects in AM materials:** inclusions, porosity, microcracks, microstructural variations, and their implications on component quality

**Characterization methods:** advanced techniques for defect analysis, including non-destructive testing (NDT), electron microscopy, tomography, and numerical simulation tools

**Effects of defects on fracture and fatigue:** correlation between defects and the degradation of mechanical properties, with a particular focus on crack propagation and fatigue crack growth mechanisms

**Influence of additive manufacturing processes:** how process parameters, base materials, and post-processing methods influence defect formation and mitigation

**Approaches to improve performance:** strategies for design for Additive Manufacturing, process optimization, material innovations, and quality control techniques



## Featured Speakers

The symposium will host renowned international experts from academia and industry who will share their experiences and the latest findings in the field. Topics will include case studies, advanced theoretical models, and cutting-edge technological solutions.

This TS is organised in the context of the project MUR PRIN 2022 PNRR- M4C2 “Dalla Ricerca all'Impresa” Investimento 1.1 Avviso MUR n. 1409 del 14 settembre 2022 - Funded by the European Union - NextGenerationEU, entitled **“Towards innovative methodologies to design metallic Additive Manufactured (AM) complex components for civil engineering structures subjected to time varying loading” - CUP D53D23018580001 - Università di Roma La Sapienza and Università di Parma**. The final goal of the present project is to propose innovative methodologies for design-against-fatigue of notched small-scale AM metallic parts used in civil engineering structures, providing: (i) new advanced scientific knowledge in the AM research field, and (ii) a construction industry tool to be both directly used for fatigue assessment and implemented into production process of complex geometries designed to optimise weight and material use. Filippo Berto is the PI of this project, whereas Sabrina Vantadori is the leader of the University of Parma research unit.