

14th International Fatigue Congress (IFC14)

Proposed session

Title: *Fatigue and Fracture in Metal Additive Manufacturing*

Session Organizers

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Abstract

Additive Manufacturing (AM) is revolutionizing the design and production of complex, high performance components across aerospace, medical, automotive, energy, and other advanced engineering sectors. However, its broader adoption in fatigue- and fracture-critical applications is hindered by the presence of inherent surface and volumetric anomalies, such as porosity, lack of fusion, and surface roughness, originating from its layer-by-layer deposition process and the very rapid solidification dynamics. This symposium aims to advance our understanding of fatigue and fracture behaviour including low cycle, high cycle, and very high cycle, and fracture behaviour in AM-produced materials and structures under a broad range of loading and environmental conditions. Topics of interest include, but are not limited to:

- Experimental characterization techniques for fatigue and fracture in AM components
- Computational modelling and simulation of fatigue crack initiation and growth
- The role of microstructure, residual stress, surface texture, and volumetric defects on fatigue mechanisms
- Environmental effects (e.g., temperature, corrosion) on durability and damage tolerance
- Understanding and modelling the process–structure–property–performance relationships for fatigue performance
- Post-processing effects (e.g., heat treatment, surface finishing, hot isostatic pressing)
- Approaches to non-destructive evaluation, qualification and certification in fatigue and fracture critical applications