



ICAM25

International Conference on Advanced Manufacturing Research to Application through Standardization

October 6-10 | Las Vegas, NV



Value Chain: Fatigue and Fracture

While Additive Manufacturing (AM) technologies are successfully used to produce functional components across various industries such as medical, aerospace, space and automotive, their application to fatigue-loaded, safety critical parts in regulated sectors—such as civil aviation—remains limited. A key barrier is the need for risk mitigation due to the impact of material flaws, requiring novel methodologies for sustainable and robust characterization. In particular, for safety-critical applications, it is essential to understand how AM-specific material characteristics and flaws (e.g., pores, lack of fusion, surface roughness, etc.) affect component integrity. Understanding these effects is complicated by the lack of historical data, the potential for variability in AM processes, and the rapid evolution of the technology. The qualification, certification, and safe continued use of AM products in fatigue critical applications will depend not only on a basic understanding of damage mechanisms and the associated behavior of typical AM flaws, but also on the development of robust, validated models and software for predicting fatigue life and fracture risk. In addition, the applicability of current fatigue and fracture standards needs to be evaluated to identify standardization gaps for generating the necessary supporting materials data.

TOPICS OF INTEREST INCLUDE BUT ARE NOT LIMITED TO:

- Case studies showing structural integrity of AM parts and components
- Component replacements from other manufacturing technologies (e.g. casting, brazed and welded assemblies)
- Development of new fatigue and fracture test methods addressing opportunities such as thin wall structures and lattices
- Defining acceptance criteria for AM components
- Modeling and verification of fatigue and fracture behavior of AM metallic materials
- Effect of defects on fatigue and damage tolerance
- Crack nucleation and damage formation mechanisms in AM materials
- Establishing process-structure-property-performance relationships
- Predictive models and software for fatigue and damage tolerance of AM parts
- Insider threats to AM security

Symposium Organizers

- **Armando Coro Allegro**, ITP Aero, Spain
- **Stefano Beretta**, Politecnico di Milano, Italy
- **Thomas Niendorf**, University of Kassel, Germany
- **Ravi Shahani**, Constellium, France
- **Jutima Simsiriwong**, University of North Florida, USA
- **Riccardo Toninato**, Enovis, Italy
- **Zachary Whitman**, Boeing Commercial Airplanes, USA

Submit
an abstract

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