ICAM26

International Conference on Advanced Manufacturing

Research to Application through Standardization

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Industry 4.0: Modeling, Simulation, and Digital Twin Ecosystems

This symposium highlights advances in modeling, simulation, and digital twins for qualification and certification of high-criticality additive manufacturing parts produced by standard and non-standard metallic AM build processes, e.g., powder-bed fusion, directed energy deposition, etc. Emphasis is on mid-TRL (technical readiness level) models, simulations, and frameworks that, once matured, will enable industry and government to expand model-based qualifications and certifications for practical applications. Contributions can be demonstrations of best practices in verification, validation, uncertainty quantification, uncertainty reduction, and sensitivity analysis, as well as case studies.

Topics of interest include but are not limited to:

- Development of validated uncertainty-quantified process-structure-property (UQ/PSP) relationships or elements thereof
- Microstructure engineering linked to material property prediction
- Methodologies that unlock insights in large statistical models, ML, and AI
- Advanced modeling to quantify performance and risk in high-criticality parts and assemblies
- Certification approaches demonstrating safe usage
- Rapid qualification/re-qualification to reduce testing and maintain process stability
- Approaches, frameworks, standards, and interfaces to guide data transfer in digital twins
- Applications of modeling, simulation, and digital twins in Q&C environments
- Knowledge generated from physics-based processes, properties, and/or performance simulations
- Integration of monitoring and feedback into digital twins

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