ICAM26

International Conference on Advanced Manufacturing

Research to Application through Standardization

ORLANDO, FL
SEPTEMBER 28 - OCTOBER 2, 2026

Value Chain: Nondestructive Evaluation and Inspection

amcoe.org/icam2026

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While traditional methods such as mechanical testing and microstructural characterizations are often used to evaluate the mechanical performance and structure of additively manufactured (AM) materials and parts, nondestructive evaluation (NDE) provides critical characterizations for additively manufactured (AM) parts without damaging the part. Since the presence of defects (e.g., pores, lack of fusion, surface roughness, etc.) often influences the mechanical performance of AM parts significantly, understanding the critical characteristics (such as type, size, and distribution) of these defects through traditional methods and NDE is key to managing performance expectations, qualification and serviceability. NDE methods can also support Geometric Dimensioning and Tolerancing and for comparisons between as-printed and finished part.

Topics of interest include but are not limited to:

- Applications of current NDE methods for AM parts
- Novel or improved NDE inspection capabilities
- Current status of standards and guidelines and needs for new standards
- Ultrasonic/Eddy Current/Resonance/x-ray/CT-scan/optical/thermal as inspection methods for defects
- Enabling targeted inspection and identification of defect formation root cause
- In-process inspection
- Techniques for evaluation and analysis of NDE results and measuring NDE process capability (POD or alternative)
- NDE modeling and simulation for AM, structural modeling, validation, and qualification
- Applications of NDE methods in serial production of AM parts: state of the art, limitations, capabilities, and future needs
- Novel materials and non-metal AM NDE
- Process control strategies for AM inspection methods
- Novel computational, autonomous, and algorithmic innovations for qualification-relevant NDE in AM
- Data-driven defect characterization and criticality assessment from NDE
- Multi-modal data fusion for AM inspection and qualification
- Uncertainty quantification and confidence metrics in NDE for AM