Non-Destructive Evaluation Methods for Additive Manufacturing

While destructive evaluation methods such as microstructural characterizations and mechanical testing are often used to qualify products, non-destructive evaluation (NDE) methods can provide significant insights without the need for sectioning and damaging the part. Due to the fact that the mechanical performance of additively manufactured parts are often affected by the presence of defects (i.e., pores, lack of fusions, surface roughness, etc.), understanding the type, size and location of defects is key to managing performance expectations and predicting performance. Furthermore, some internal features of additively manufactured parts, for example in lattice structures or cooling channels, cannot be measured easily. Therefore, NDE methods covering both in-process monitoring and post-built inspection, become crucial in identifying defects and evaluating the quality of the additive product. For this reason, topics in this symposium cover current & novel NDE methods and in-process monitoring techniques as they pertain to additive manufacturing.

We welcome all abstracts within the scope of the following topics:
- Applications of current NDE methods for additive manufactured parts
- Novel or improved NDE inspection capabilities
- Current status of standards and guidelines and needs for new standards
- Ultrasonic/Resonance/X-Ray/CT-scan as inspection methods for defects
- NDE as an enabler for defect formation understanding and mitigation
- “Effect-of-defect” (structural modelling, NDE, mechanical testing, etc.), enabling targeted inspection
- In-process monitoring & inspection

ORGANIZERS
- Ben Dutton, The MTC, UK
- Anton Du Plessis, Stellenbosch University, South Africa
- Alex Kitt, EWI, USA

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Session 2

Non-Destructive Evaluation Methods for AM

Session Chairs TBD

8:00 a.m. Invited Talk: Effect of defects on mechanical properties of additive manufactured titanium alloys, and information for NDE requirements
Xiang Zhang, Coventry University

8:30 a.m. Regular Talk: Evaluation of the Performance of Automated Defect Recognition (ADR) Algorithms at Void Detection in the X-ray CT Data Set of a Ti-6Al-4V AM Component
Griffin Jones, Penn State Applied Research Lab

8:50 a.m. Invited Talk: Advanced Computed Tomography characterization techniques: Lessons from medical CT
Timothy P. Szczykowski, University of Wisconsin Madison

9:20 a.m. Regular Talk: Robust AM Inspection via In-process Monitoring and Model Assisted Post Build NDT
Benjamin Dutton, The MTC, UK

9:40 a.m. Invited Talk: Conventional vs. Additive Manufacturing: Comparative Eddy Current Testing on Reference Blocks
Catalin Mandache, National Research Council Canada/Aerospace Research Centre

10:10 a.m. Regular Talk: Empirical and simulated x-ray computed tomography probability of detection analysis and calibrated defect artifact development
Felix H. Kim, National Institute of Standards and Technology

10:40 a.m. Regular Talk: Combining In-situ Monitoring and X-Ray Computed Tomography to Assess the Quality of Parts Manufactured by Laser Powder Bed Fusion and Electron Beam Melting
Philip Sperling, Volume Graphics GmbH

11:00 a.m. Regular Talk: Towards real-time explainable artificial intelligence for in-process monitoring
Jan Lukas Augustin, Fraunhofer IAPT

11:40 a.m. Invited Talk: Novel or Improved NDE Inspection Capabilities (RAM, PCRT on Lattice Structures)
Anne-Françoise Obaton, Laboratoire national de métrologie et d'essais (LNE)

12:10 p.m. Regular Talk: Real-Time Layer In-situ Inspection Via Profilometry for Improved AM Productivity
David Maass, Flightware

1:30 p.m. Invited Talk: Overview of Standardization Efforts for Nondestructive Testing in Additive Manufacturing
Patrick Howard, GE Aviation

2:00 p.m. Invited Talk: Process Compensated Resonance Testing for Nondestructive Evaluation, Qualification, Monitoring and Control of Additive Manufacturing Processes
Eric Biedermann, Vibrant Corporation

2:30 p.m. Invited Talk: Comparative metrological characterization of Ti6Al4V lattice structures produced by laser powder bed fusion
Michele Dallago, University of Trento

3:30 p.m. Invited Talk: An In-situ Imaging and Data Analytics for Selective Laser Sintering in Presence of System Degradation
Xu Chen, University of Washington

4:00 p.m. Invited Talk: Enabling the Qualification of X-ray Computed Tomography: Acquisition to Analysis
Nick Brierley, The MTC, UK

10:30 BREAK | 12:30 LUNCH | 3:00 BREAK | 4:30 SESSION ENDS