INDUSTRIAL & MANUFACTURING ENGINEERING SEMINAR ANNOUNCEMENT

Qualification of Additively Manufactured Metallic Components

Dr. Suresh Babu
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University of Tennessee

Friday, Nov. 17
11:00 a.m.
Room 114, MRB

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Dr. Babu obtained his bachelor's degree in metallurgical engineering from PSG College of Technology, Coimbatore, India, and his master's degree in industrial welding metallurgy-materials joining from Indian Institute of Technology, Madras. He obtained his PhD in materials science and metallurgy from University of Cambridge, UK in 1992. He also worked as a research associate in the prestigious Institute for Materials Research, Sendai, Japan before joining ORNL in 1993. From 1993 to 1997, he held joint researcher position with ORNL, University of Tennessee and The Penn State University. From 1997 to 2005, he worked as an R&D staff at ORNL. From 2005 to 2007, Suresh held a senior level technology leader position in the area of engineering and materials at Edison Welding Institute, Columbus, Ohio. From 2007 to 2013, Dr. Babu served as Professor of Materials Science and Engineering and Director of NSF I/UCRC Center for Materials Joining Science for Energy Applications at The Ohio State University. In 2013, he was appointed as UT/ORNL Governor's chair of advanced manufacturing at the University of Tennessee, Knoxville, TN. 2020, senior advisor for research and STEM to the Provost and Vice Chancellor of Research.

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This event sponsored by FAMU-FSU Engineering Department of Industrial & Manufacturing Engineering

In the past decade, additive manufacturing (AM) has emerged as a viable method for producing metallic components used in aerospace and energy sectors. While AM's capability to fabricate intricate geometric parts has been proven, ensuring the certification of these components for crucial applications remains challenging. This challenge stems from the distinct spatial and temporal variations in thermal, mechanical, and chemical attributes within individual components, deviating significantly from conventional manufacturing processes. Consequently, the conventional practice of certifying AM parts via coupon-based qualification may not always be feasible.

In this presentation, we will provide an overview of current qualification techniques relying on extensive testing. Furthermore, we will explore emerging methodologies incorporating in-situ monitoring, computational modeling, machine learning, and artificial intelligence. We will illustrate the application of these methodologies through case studies involving the qualification of metallic components manufactured via AM for both energy and aerospace applications.