

### CNDE Webinar Presentation

June 15, 2021 at 2:00 p.m. U.S. Central Time

This webinar will be recorded and made available on the CNDE website

## Principles of Additive Manufacturing and Their Impact on Possibilities of Quality Assurance

**Presented by: Professor Pete Collins**  
**Materials Science & Engineering Department**  
**Iowa State University**

**Abstract** - In this technical presentation, I will discuss the principles of additive manufacturing, especially related to metals-based additive manufacturing. This talk will present a short history of AM, as the evolution of our understanding has paralleled the evolution of the processes themselves. The core of the talk will address our understanding of the interrelationships between the process(es) and the evolution of the materials state and its influence on properties and performance. There is still much that we don't understand, and so some vignettes into recent discoveries will be presented, as will some technical possibilities once we fully understand and can predict the process, structure, and performance of any arbitrary material and process. The talk will conclude with some possibilities related to AM-NDE, but will present this more as an important yet still very underdeveloped technical space.

P.C. Collins is a Professor and Entrepreneurial Fellow within the Department of Materials Science and Engineering at Iowa State University and an affiliated faculty in Aerospace Engineering. He received his Ph.D. from The Ohio State University in Materials Science and Engineering. Prior to starting in his first university role, he set up a not-for-profit advanced manufacturing facility embedded in an Army Arsenal. Dr. Collins is actively involved in two NSF Industry/University Cooperative Research Centers, serving as the co-director for the Center for Advanced Non-Ferrous Structural Alloys, and as past director for the Center for Nondestructive Evaluation (CNDE). His primary research interests involve: the physical metallurgy of advanced non-ferrous materials; advanced characterization techniques including various electron microscopies and emergent spectroscopic methods; quantification of defects and crystal orientation across length scales; combinatorial materials science; advanced materials processing with special interest in additive manufacturing; and the mechanical behavior of non-ferrous materials, including establishing composition-microstructure-property relationships. He has conducted basic and applied research on metal-based additive manufacturing for over 20 years, and most recently has worked to demonstrate new methods to fully characterize the materials state of additively manufactured metallic systems. He has received multiple awards for teaching and his research, and has been actively involved in a variety of professional societies, planning of conferences and symposia, various government panels and working groups, and has 50+ publications, 50+ invited talks, and multiple US patents.



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