

MAR15-2014-020226

Abstract for an Invited Paper
for the MAR15 Meeting of
the American Physical Society

Additive Manufacturing Enabled Ubiquitous Sensing in Aerospace and Integrated Building Systems¹

JOSEPH MANTESE, United Technologies Research Center

Ubiquitous sensing is rapidly emerging as a means for globally optimizing systems of systems by providing both real time PHM (prognostics, diagnostics, and health monitoring), as well as expanded in-the-loop control. In closed or proprietary systems, such as in aerospace vehicles and life safety or security building systems; wireless signals and power must be supplied to a sensor network via single or multiple data concentrators in an architecture that ensures reliable/secure interconnectivity. In addition, such networks must be robust to environmental factors, including: corrosion, EMI/RFI, and thermal/mechanical variations. In this talk, we describe the use of additive manufacturing processes guided by physics based models for seamlessly embedding a sensor suite into aerospace and building system components; while maintaining their structural integrity and providing wireless power, sensor interrogation, and real-time diagnostics. We detail this approach as it specifically applies to industrial gas turbines for stationary land power.

¹This work is supported through a grant from the National Energy Technology Laboratory (NETL), a division of the Department of Energy