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RESEARCH REPORT

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Kevin T. Slattery, D.Sc

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The Barnes Global Advisors

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Kevin T. Slattery, D.Sc—Kevin is a Principal ADDvisor® at The Barnes Global Advisors (formerly The Barnes Group Advisors). His primary expertise is in Metallic Additive and Metals Manufacturing, focusing on test program development, process and product verification, qualification, and certification. He has supported over 25 clients on five continents throughout the entire additive manufacturing value chain—from raw material to finished components.

Kevin was previously the Chief Scientist for Additive Manufacturing at Boeing Research and Technology (BR&T). He was responsible for developing and integrating the technology roadmaps and development plans for metallics additive manufacturing for the entire company, along with building and leading a multi-skilled team to execute and deliver the technology throughout the enterprise. Prior to that, he was the Chief Scientist for Metals, Ceramics, and Mechanical Systems at BR&T, with the responsibility for portfolio development and coordination, while executing the additive manufacturing portion.

He served as the Division Chief Engineer for the US Navy and US Air Force fighter aircraft and US Army rotorcraft in Boeing's Military Sustainment organization. From 1997 to 2012, he was on the BR&T Metals Team as a researcher and senior manager, where he primarily developed advanced low-cost titanium processing technologies supporting all Boeing products. He was the technical and programmatic lead in implementing the first aerospace metal-additive manufactured structural aircraft components for both spares and production, with five other first-in-the industry technology implementations.

He began his career at McDonnell Douglas (now Boeing) as a nondestructive testing engineer, where he developed inspection technologies for metallic and composite components, along with integrating impact of discontinuities with the acceptance criteria for carbon/epoxy composites.

Dr. Slattery holds BS and MS degrees in Metallurgical Engineering from University of Missouri-Rolla (now Missouri S&T) and a D.Sc in Material Science and Engineering from Washington University in St. Louis. He currently holds 36 US patents, with another 15 applications pending; along with 36 significant publications and conference presentations.

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Abstract

Additive manufacturing (AM) technology, also known as 3D printing, has transitioned from concepts and prototypes to part-for-part substitution and the creation of unique AM-specific part geometries. These AM applications are increasingly present in demanding fields such as medicine and aerospace. Generally, however, the applications are still primarily driven by thermal, stiffness, compression, and static loading conditions. In order to move to the next levels of structural significance (durability and damage tolerance), the AM technologies and components will need to reliably demonstrate freedom from inherent discontinuities that degrade durability to the point of preventing consideration in fatigue environments. This also includes freedom from rogue discontinuities that have the same impact on damage tolerance. Not only will the processes themselves need to be stable, robust, and repeatable enough to minimize the probability of such discontinuities occurring in the first place, but nondestructive testing (NDT) technology and methods will need to be sufficiently capable and reliable to ensure (within a reasonable level of risk) that such discontinuities will be detected to prevent the components from being accepted for use. Finally, while not the focus of this report, they will also be needed to inspect in-service components for damage and the start or growth of fatigue cracks.

As the second installment of a six-part series of SAE EDGE™ Research Reports on AM, this report discusses the need, challenges, technologies, and opportunities for NDT in AM. While it will focus on metallic components and technologies, it will also introduce ceramic and polymer composite components, as these technologies are being developed and implemented in increasingly mission-critical, if not durability and damage tolerance-critical applications.

NOTE: SAE EDGE™ Research Reports are intended to identify and illuminate key issues in emerging, but still unsettled, technologies of interest to the mobility industry. The goal of SAE EDGE™ Research Reports is to stimulate discussion and work in the hope of promoting and speeding resolution of identified issues. SAE EDGE™ Research Reports are not intended to resolve the challenges they identify or close any topic to further scrutiny.

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