Evolution of Pore Distribution in the Binder Jetting of WC-Co

Dr. Paul Prichard, Senior Staff Innovation Engineer, Additive Manufacturing R&D
Kennametal, Inc.

ABSTRACT

Binder jetting is an additive manufacturing process which uses drop on demand print technology to produce complex 3D objects. The organic binders must subsequently be removed, and the 3D objects sintered to near full density. The as-printed microstructures contain a wide distribution of porosity resulting from the printing process, powder packing arrangement and powder synthesis process. Print parameters such as droplet size, binder saturation percentage and layer thickness are the key parameters, which have an influence on the porosity size and distribution. The sintering process required to create full density components is dependent on the powder arrangement and the pore distribution in the as-printed structure. This presentation will discuss the relationship between the powder distribution, print parameters, pore size distribution and the resulting sintered microstructures.

BIOGRAPHY

Paul Prichard is the R&D group leader for Kennametal’s Additive Manufacturing team at the Quentin McKenna Technology Center in Latrobe, PA. Previously, he was a team member of the Innovation Ventures Group at Kennametal, which evaluated, developed and commercialized emerging technologies to create new business opportunities. He has collaborated with numerous academic institutions, government labs and entrepreneurial organizations throughout his career. In addition to Kennametal, Paul has worked in various R&D roles at 3M, Ames Laboratory and Howmet Aerospace, and has over 20 patents related to materials and manufacturing. He has a BS in Metallurgical Engineering from Michigan Technological University, a MS from Case Western Reserve University and a PhD in Materials Science and Engineering from Iowa State University. He is the past-Chairman of the TMS Powder Committee, member of the TMS Materials Processing & Manufacturing Division Council, Additive Manufacturing committee and actively participates in ASM, APMI and SME.