

## **2018 International Conference on Materials Science and Manufacturing Engineering (MSME 2018)**

**Keynote title:** System-level Tools for Integrating Metal Additive Manufacturing Technologies in Production Lines

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### **Abstract**

The Additive Manufacturing (AM) of metal parts made a significant progress in the last two decades. Especially, there have been significant advances in single-step Powder Bed Fusion (PBF) technology and currently laser-based PBF can be considered the most widely adopted process for metal AM. Multi-step Binder Jetting followed by Sintering (BJ+S) technology has advanced too and now it is commercially offered for one-off and batch manufacture of metal parts. In general, the metal AM technologies have matured to reach a level where they can be considered as viable alternatives for producing near net shape parts that can meet the requirements of niche markets, mostly for small batch manufacture. However, to increase productivity, quality and cost-effectiveness of such single and multi-step metal AM technologies, it is necessary to integrate them in production lines with complementary and at the same time mature and widely used by industry technologies, e.g. the whole range of machining, heat treatment and surface engineering processes. To achieve this it is necessary to create system-level tools for interfacing metal AM processes with pre-processing and post-processing machining technologies into production lines and thus to meet specific application requirements. The talk presents the development of generic integration tools for improving the system-level performance of metal AM technologies. In particular, the research reports the design and implementation of modular workholding systems, automated workpiece setting up routines and inline inspection/monitoring solutions for interfacing BJ+S and laser-based PBF technologies with pre- and post-processing processes. Pilot implementations are used to demonstrate the flexibility and operability of the proposed tools to address important system-level issues in integrating metal AM technologies in production line. Case studies will be used to illustrate the capabilities of these tools when employed for producing complex parts.

### **Biography**

**Stefan Dimov**, Dipl. Eng., PhD, DSc, FIMechE, is Professor of Micro Manufacturing and Head of Advanced Manufacturing Technology Centre at Department of Mechanical Engineering, the University of Birmingham. He obtained his Diploma Engineer and Doctoral degrees from Moscow State University of Technology and Doctor of Science degree from Cardiff University. His research interests encompass the broad area of advanced manufacturing with a special focus on Micro and Nano Manufacturing, Additive Manufacturing and Hybrid Manufacturing technologies. He established the Micro Manufacturing and Hybrid Manufacturing labs in Birmingham, which are now widely recognised for their internationally leading research. His academic output includes more than 250 technical papers and 13 books. He has supervised over 25 PhD theses to completion. He has

won in excess of £30M in external research grants and contracts. He is Associate Editor of the ASME Journal of Micro- and Nano-Manufacturing and Precision Engineering Journals. In addition to pursuing and leading research, he has also been very active with knowledge transfer to industry, applying the results of his work to help multinational companies and SMEs to create wealth and safeguard jobs. He has established the Multi-Material Micro Manufacture (4M) Community in 2004 through the FP6 4M NoE programme and currently he is Executive Officer of the self-sustained 4M Association ( [www.4m-association.org](http://www.4m-association.org) ). He is the recipient of Thomas Stephens Group Prize awarded by the Institution of Mechanical Engineers in 2000 and 2003.