

**Unsettled Technology
Domains in Aerospace
Additive Manufacturing
Concerning Safety,
Airworthiness, and
Certification**

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About the Author



Dr. Jody E. Muelaner is a chartered mechanical engineer with a background in metrology, aerospace manufacturing, and machine design. He now specializes in writing about technical topics in a way that the target audience can easily understand.

His writing has included technical reports for Rolls-Royce and Airbus, peer-reviewed journals, and UK Government reports, as well as magazines and websites. He has published several hundred articles and was awarded the Sage Best Paper Award in 2010.

Starting out in machine design, Dr. Muelaner initially worked on sawmills, waste-processing machinery, domestic appliances, and medical devices. After moving into metrology, his research focused on modelling and optimizing uncertainty in manufacturing systems, enabling right-first-time assembly, and the design of innovative laser instruments. He founded Muelaner Engineering Ltd in 2018 to provide consultancy and technical writing within advanced manufacturing and machine design.

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contents

About the Author	
Unsettled Technology Domains in Aerospace Additive Manufacturing Concerning Safety, Airworthiness, and Certification	3
Introduction	4
<i>State of the Industry</i>	4
<i>Advantages of AM Parts</i>	7
<i>AM Parts in Aerospace Production</i>	7
Unsettled Topics	8
<i>Design Optimization</i>	8
Recommendations	9
<i>3D Geometry Representation and Preprocessing</i>	9
Recommendations	10
<i>Understanding and Modelling Material Deposition</i>	10
Recommendations	11
<i>Process Control</i>	11
Recommendations	12
<i>Establishing Material Properties</i>	12
Recommendations	12
<i>Defect Detection</i>	14
Recommendations	15
Unsettled Topics Concerning PBF Processes	15
<i>Amortized Machine Cost</i>	15
Recommendations	15
<i>Powder Cost and Availability</i>	15
Recommendations	16
<i>Powder Reuse and Recycling</i>	16
Recommendations	17
<i>Operator and Facility Safety</i>	17
Recommendations	17
<i>Surface Finish</i>	17
Recommendations	18
Unsettled Topics Concerning DED Processes	18
<i>Postprocess Machining</i>	18
Recommendations	18
<i>Feed Issues</i>	18
Recommendations	18
<i>Developing Hybrid Processes</i>	18
Recommendations	18
Conclusions	18
SAE EDGE™ Research Reports	19
<i>10 Steps for Additive Manufacturing</i>	19
Recommendations	20
Abbreviations/Definitions	20
Acknowledgments	21
Bibliographic References	21
Contact Information	23

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Abstract

Additive manufacturing (AM) is currently being used to produce many certified aerospace components. However, significant advantages of AM are not exploited due to unresolved issues associated with process control, feedstock materials, surface finish, inspection, and cost. Components subject to fatigue must undergo surface finish improvements to enable inspection. This adds cost and limits the use of topology optimization. Continued development of process models is also required to enable optimization and understand the potential for defects in thin-walled and slender sections. Costs are high for powder-fed processes due to material costs, machine costs, and low deposition rate. Costs for wire-fed processes are high due to the extensive postprocess machining required. In addition, these processes are limited to low-complexity features. Incremental improvements in all of these areas are being made, but a step change could potentially be achieved by hybrid processes, which use wire feedstock to deposit the bulk of the part and powder for fine detail.

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