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RESEARCH REPORT

Unsettled Technology Domains in Industrial Metrology

Dr. Jody E. Muelaner

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About the Editor

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 modeling and optimizing uncertainty in manufacturing systems, enabling right-the-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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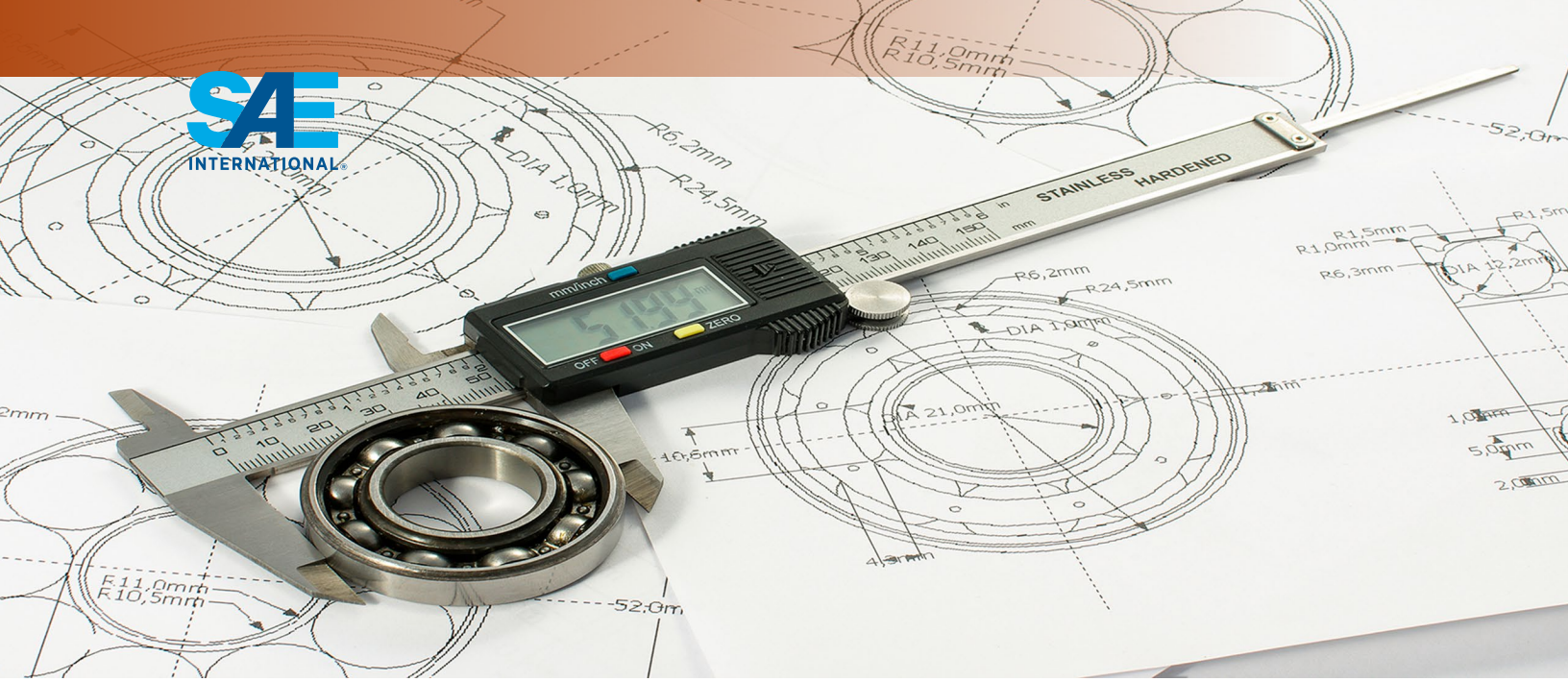

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Unsettled Technology Domains in Industrial Metrology

Abstract

Within manufacturing, measurements are used to make decisions related to product verification and process control. The selection of production machines and instruments involves a trade-off to achieve the required accuracy while minimizing cost. Similarly, deciding on the level of confidence at which products are rejected is a trade-off between the cost of rejecting acceptable parts and the cost of passing substandard products to the customer. These trade-offs can only be optimized if the uncertainties are fully understood. Currently multiple methodologies are used to understand uncertainties and variation within manufacturing, such as measurement systems analysis (MSA), statistical process control (SPC), and uncertainty evaluation. The industry lacks a unified approach that provides a complete understanding of uncertainty. This means that optimal decisions cannot be made to maximize the profitability of production systems.

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 issues they identify or close any topic to further scrutiny.

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