Editorial

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Biographical notes: Laurent Deshayes is Professor at the University of Auvergne, France. His research work concerns machining systems under uncertain environments and maintenance strategy for mechatronic systems. He spent two years as Guest Research at the National Institute of Standards and Technology where he developed strong research skills in smart machining systems. He is also CEO of a consulting and learning company in Morocco in the field of manufacturing and mechatronic. More particularly this company develops e-learning based applications dedicated to the North African countries.

A. Donmez has been with NIST as a Mechanical Engineer for more than 20 years in conducting and supervising research in machine metrology and high-precision manufacturing. He studied at Purdue University as a Fulbright Scholar and received his MS and PhD Degrees (1985). During his carrier at NIST, he received various awards, including R&D 100 Award, US Department of Commerce Bronze and Silver Medals and NIST Applied Research Award. He has published over 50 technical papers and reports. He has been an active participant in the national and international standard committees related to machine tool metrology and machine performance characterisation.

T. Özel received his PhD in Mechanical Engineering from The Ohio State University in 1998. He is Associate Professor of Industrial and Systems Engineering at Rutgers University and the director of Manufacturing Automation Research Laboratory. His research interest includes computational modelling of machining processes, automated manufacturing and process

control, optimisation of processes and systems, and micro-manufacturing sciences. He is the recipient of 2008 Machine Tool Technologies Research Foundation award and several best paper awards. He has been editor, guest editor, editorial board member and reviewer for several international journals. He has published over 60 refereed papers in international journals and conferences.

Rapidly changing market demands require rapid response from manufacturers by shortening product development cycles and increasing flexibility and throughput in manufacturing systems and supply networks while reducing environmental impacts and energy requirements. These requirements necessitate the transformation of manufacturing from practices based on experience and internal company guidelines to scientific-based modelling, optimisation, decision-making and execution. There are significant challenges that are facing the manufacturing sector relating to product and process design, science-based understanding of manufacturing process and equipment performance and capabilities, smart manufacturing equipment operation and process control, condition monitoring and knowledge integration frameworks. Smart Machining Systems (SMSs) are the next stage in the evolution of machining systems to respond to these challenges. A SMS will enable cost-effective manufacturer to specification, and on schedule, of first and every part. Such systems will complement and enhance the effectiveness of machine operators, process planners and design engineers in the manufacturing enterprise by sharing the knowledge and information among these functions to optimise the design and manufacturing processes to their fullest. SMSs are envisioned to have the following characteristics:

- self-recognition and communication of their capabilities to other parts of the manufacturing enterprise
- self-monitoring and optimising their operations
- self-assessing the quality of their own work
- self-learning and performance improvement over time
- enhancing human interaction.

This special issue presents sampling of technical work by researchers worldwide tackling the above-mentioned characteristics of SMSs and providing means of improving the science-based understanding and improvement of machining systems.

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