Editorial

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Biographical notes: K. Chou is an Associate Professor in Mechanical Engineering Department at the University of Alabama. He received his PhD in Industrial Engineering from Purdue University. His teaching and research interests include design and manufacturing, CAD/CAM, mechanics, material, metrology and tribology.

Raja Kountanya has been a machining applications engineer with Diamond Innovations for the past six years. He completed his PhD from the University of Michigan in 2002 studying effect of edge geometry on orthogonal cutting mechanics for his dissertation in Mechanical Engineering. He studied wear mechanisms of tool coatings for his Masters thesis from Michigan State University, receiving his Degree in Mechanics in 1998. He completed his Bachelor of Technology in Mechanical Engineering from the Indian Institute of Technology, Madras in 1996. His research interests include conventional (metal cutting) and non-conventional (electrical discharge machining) manufacturing processes.

T. Özel received his PhD in Mechanical Engineering from the Ohio State University in 1998. He is an Associate Professor of Industrial and Systems Engineering at Rutgers University and the Director of Manufacturing Automation and Research Laboratory. His current research interests include computational modelling of manufacturing processes, machining, automated manufacturing and process control, optimisation of processes and systems, and micro/nano manufacturing sciences. He has been reviewer, editor and editorial board member, scientific committee member, for several international journals and conferences. He has over 50 refereed publications in international journals and conferences.

With over 100-year development, 'cutting tool' is still one of the key elements inseparable from high-productivity, high-precision machining operations. Driven by advanced material processing and fabrications, cutting tools have been evolving to have, e.g., the hardest ever coating and the smallest ever configuration. In parallel, many emerging machining technologies, such as micro-scale machining, minimum-lubrication machining and machining of abrasive materials, etc., all require new cutting tools with performance uncharacteristic of conventional tooling. These cutting tools, either with unique materials or geometry, encounter sophisticated loading during machining and exhibit distinct thermomechanical behaviour. In addition, tool wear monitoring using new sensor technologies and tool life predictions using neural network approaches, etc., are equally important to advance the overall production and manufacturing systems. This special issue of the *International Journal of Mechatronics and Manufacturing Systems* (IJMMS) includes eight research papers related to cutting tool modifications, tooling for machining advanced materials, tool wear characterisations, fundamental tool-workpiece contact problems, sensor technologies for tool condition monitoring, tool wear effects on part surface integrity, and stress analysis of diamond coated tools. A brief summary of the main contributions is discussed below.

First two papers are related to special tooling. Lei et al. investigate microholes and microgrooves, using femtosecond laser, on the rake face of uncoated tungsten carbide (WC) inserts. Wang et al. present rotary ultrasonic machining of potassium dihydrogen phosphate (KDP) crystals, which are widely used as important electro-optic parts. The third paper by Kuo et al. examines the relationship between microstructure and material content at critical locations of used WC-Co ball-end mills. The special issue continues with two papers on novel sensor techniques for tooling condition monitoring. Suprock and Nichols' paper introduces a wireless high bandwidth transmitter for s ensor-integrated metal cutting tools. Werschmoeller and Li present embedded micro thin-film sensors into poly-crystalline cubic boron nitride (PCBN) for tooling applications. Next, Kountanya discusses a lower-bound estimate of plowing forces using elastic contact analysis of the cutting tool with the work material moving underneath. Choi and Liu investigate the effect of tool wear on the rolling contact fatigue performance of superfinish hard machined surfaces. Finally, Renaud et al. apply Computer-Aided Design (CAD) and Finite Element Analysis (FEA) software for 3D simulations of residual deposition stresses generated in diamond-coated cutting tools.

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