Editorial

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Biographical notes: Tugrul Özel received a PhD in Mechanical Engineering from The Ohio State University in 1998. He is an Assistant Professor of Industrial and Systems Engineering at Rutgers University and the Director of Manufacturing Automation and Research Laboratory. His current research interest include computational modelling of manufacturing processes, machining, automated manufacturing and process control, optimisation of processes and systems and micro/nano manufacturing sciences. He has over 10 years of experience in teaching and researching about machining systems and manufacturing automation. He has been Reviewer, Symposium Organiser, Guest Editor and Editorial Board Member for several international journals and conferences. He has published over 50 refereed articles in international journals and conferences.

J. Paulo Davim received his PhD in Mechanical Engineering from the University of Porto in 1997 and the Aggregation from University of Coimbra in 2005. Between 1986–1996, he was a Lecturer in University of Porto. Currently, he is an Aggregate Professor in theUniversity of Aveiro and the Head of MACTRIB (Machining and Tribology Research Group). He has 20 years of teaching and research experience in manufacturing processes. He is the Editor of two International Journals, Guest Editor, Editorial board member, Reviewer and Scientific Advisory for many international journals and conferences. He has also published more than 150 papers in refereed international journals and conferences.

Rough/finish machining of hardened steels is a challenging process and desired part quality (surface finish and tolerance) requirements are tough to achieve with conventional machinery due to process stability problems associated with rigidity, chatter vibrations and wear behaviour of cutting tools. Accurate and reliable analysis to simulate the hard turning process and predict process variables such as forces, detailed temperatures, stresses, tool wear, residual stresses and surface integrity are essential for process planning. Optimisation of the performance of cutting tools has been widely studied over the past through improvements in the macrogeometry, cutting materials and multilayer coating systems. However, current research activities reveal that microgeometry of the edge design tools significantly influences the cutting forces, tool wear, surface roughness and integrity in hard turning. This Special Issue of the *International Journal of Machining and Machinability of Materials* (*IJMMM*) includes research papers related to recent advances in modelling and analysis of hard turning processes. This issue includes nine papers, which address the issues associated with hard turning operations. A brief summary of the main contributions is discussed below.

First three papers are dedicated to process modelling and simulations in hard turning. Hu et al. present a 3D force modelling approach for finish hard turning process. Arrazola and Özel's paper presents a new numerical modelling approach based on Arbitrary Lagrangian Eulerian method to model chip formation in 3D hard turning problem using a cutting tool with chamfered geometry. This model predicts cutting forces, temperatures as well as machining induced stresses on the subsurface of the AISI 52100 steel work material. Comparions with experimental residual stress measurements are also provided. In a related work, Karpat and Özel introduce process simulations for 3D turning using uniform and variable microgeometry cutting tools. Influence of edge microgeometry on the process variables; cutting forces, tool temperatures and chip formation in machining of AISI 4340 steel has been presented with experiments and simulations. It is concluded that microgeometry can be designed and optimised for a given hard turning problem in order to reduce heat built-up and associated tool wear on PCBN tools.

The Special Issue continues with three papers on experimental observations of hard turning. Rech et al. discuss the influence of cutting tool constitutive parameters on residual stresses induced by hard turning. Experimental results for residual stresses induced by hard turning with wiper inserts are also presented in this work. Grzesik investigates wear behaviour of mixed ceramic tools and deterioration of surface finish in the machining of an AISI 5140 hardened alloy steel. Kamely et al. discusses the effectiveness of coatings when turning hardened cold work AISI D2 tool steel.

The Special Issue ends with three papers on computational methods and optimisation of hard turning processes. Palanisamy and Shanmugasundaram present modelling of tool wear and surface roughness using regression and artificial neural networks. Aggarwal et al. discuss modelling and analysis of machining parameters in hard turning of AISI P-20 steel using response surface methodology and desirability functions. Srivastava and Srivastava present optimisation of process parameters lubricant assisted machining of AISI 1040 steel by using response surface methodology.

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