
Editorial

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Biographical notes: R. Balasubramaniam is involved in the area of Precision Manufacturing for the last three decades and is currently heading the Precision Engineering Section of Bhabha Atomic Research Centre, India. His area of expertise includes design and manufacturing of precision components and systems for various applications in nuclear industry, micro machining and nano finishing. He is a Faculty in Homi Bhabha National Institute, a Deemed University of Department of Atomic Energy and he guides a number of students for their doctoral and master degrees.

Jose Mathew is a Professor and Ex-Dean (Research and Consultancy) of the National Institute of Technology Calicut, Kerala. He received his MTech and PhD from IIT Kanpur (1990) and IIT Bombay (1999) respectively. His interests are micro and nano-machining process, precision and ultra-precision machining, modelling and analysis of machining of 'difficult to machine' materials, etc. He has published more than 35 research papers in international journals and more than 78 research papers in international conferences. Several MTech and PhD thesis have been completed under his guidance. He has also worked on number of industry sponsored research and development projects.

Micromanufacturing is a key for miniaturisation of devices and systems. It facilitates understanding the science of manufacturing at a small scale, developing relevant technologies and applying them for the product realisation. Micromanufacturing processes include micromachining, microforming, microjoining, nanofinishing, micro-/nano-metrology, etc. In the last few decades, research and applications of various micro manufacturing processes have taken a leap which resulted in the development of a number of hybrid micromanufacturing processes. Continuous research in the relevant areas aiming to understand the basics of these processes has enabled in achieving comparatively lower cost and higher quality products.

This special issue on '*Micromanufacturing*' has been brought out from the selected papers presented in the International Conference on Precision, Meso and Nano Engineering (COPEN-8) held at National Institute of Technology Calicut, Kerala, India

during 13–15 December, 2013. The papers were substantially expanded and re-reviewed as per IJPTech policy. This volume contains papers in the area of micro electrical discharge machining, micro electrochemical machining, micromilling, nanofinishing and miscellaneous.

First paper reports that Artificial Neural Network predicted electrode wear of 70% training set correlates well with the measured electrode wear in wire EDM on three different materials. In the second paper, authors have proposed a modified ‘volume removal per pulse’ approach for ‘real time volume estimator’ in μ EDM-drilling. They also suggested that this estimator could be used for online tool wear compensation in combination with the target volume in μ EDM-drilling. Third paper proposes mathematical models based on heat transfer principle which have been developed for the simulation of single resistance-capacitance pulse discharge in micro electric discharge machining of Ti-6Al-4V. These models have been used to predict the size and shape of the single spark crater by finite volume as well as finite element methods. It is further reported that the predicted crater shapes by both these models are in good agreement. The fourth paper reports about the micro pattern generation by electrochemical micro machining process. Machining of complex 3D micro patterns of an air lubricated bearing was investigated to determine the influencing process parameters for controlling depth and roughness values of the generated micro patterns.

The dynamic response of micro milling cutter by super position method and also damping effects on its dynamic performance, are discussed in the fifth paper. Compared with the conventional ultra precision machine tool, the excitation in miniaturised machine tool is mainly due to micro cutting force and hence its dynamic behaviour is significant from the viewpoint of obtaining good surface finish and high tool life. A detailed mathematical treatment has been outlined to evaluate dynamic response of a micro tool for the first three normal modes under un-damped free vibration conditions. The estimated damping ratio values were in agreement with those of lightly damped linear structure.

Sixth and seventh papers deal with nanofinishing. In the sixth paper, a mathematical model for the recently developed chemo-mechanical magneto rheological finishing process has been developed to understand the finishing mechanism and to investigate polishing pressure as well as other controlling parameters. The authors have developed a model and validated it with the experiments. Their major finding is that the polishing pressure has varying level of interaction with working gap as well as with the volume of MR fluid. The seventh paper reports the results of the detailed study of MR polishing fluid components at different magnetic field conducted through statistical design of experiments to predict the contribution of each model term affecting yield stress and viscosity. Their study indicates that magnetic field has the highest contribution followed by carbonyl iron particles concentration, to the yield stress and viscosity. They have also concluded that when the total solid contents of MR polishing fluid exceeds 35%, there is a decrease in the yield stress. Application of Al_2O_3 nano particles suspended fluid during grinding of Ti-6Al-4V alloy is explained in the last paper. The authors have examined the potential of Al_2O_3 nano particles suspended fluid under MQL mode to improve the grinding characteristics of Ti-6Al-4V alloy. They have found that MQL with nano particles suspended fluid reduces the normal forces and tangential forces on an average of 12 % and 28 %, respectively when compared to the wet condition and MQL with soluble oil.

We are thankful to Editor-in-Chief, Dr. V.K. Jain who has kindly agreed to bring out this special issue on 'Micromanufacturing' from the expanded and re-reviewed papers from COPEN-8 Conference held at NIT Calicut. We are also thankful to the administration of NIT Calicut and the Advisory committee of the conference who shouldered on us the responsibility of bringing out this special issue. We appreciate the efforts made by the authors in improving their papers presented in the conference and the referees for the thorough evaluation of these papers by providing useful and critical comments to improve the quality of the papers. We would also like to put on record the help and cooperation extended by Mrs. Barbara Curran, Inderscience Publishers.