
Editorial

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Biographical notes: Vijay Kumar Jain has done his MTech and PhD from the University of Roorkee (now IIT Roorkee). He has served as a Visiting Professor at the University of Nebraska at Lincoln (USA) and University of California at Berkeley (USA). Presently he is a Professor at Indian Institute of Technology Kanpur. He has also served as a faculty member at MNREC Allahabad, BITS Pilani, and MREC Jaipur. He has won three gold medals, two silver medals and one best paper award as recognition to his research work. He is editor of two international journals and Associate Editor of *Int. J. Advanced Mfg. Systems*. In recognition to research work of him, he has been opted as a member of the editorial board of 11 international journals. He has also worked as a Guest-Editor for four special issues. He has around 200 research publications to his credit. He has also written four books.

1 Introduction

Manufacturing has been benefited significantly from the recent developments in the areas such as IT, microelectronics, new materials, advanced sensors and actuators. Computer support in manufacturing covering design, process control and data transfer have enabled manufacturing to scale new heights leading to globalisation and resource optimisation. An increased awareness of the environment and the need to conserve energy has led to new developments in this field. International competition with customer focus has brought out the importance of excellence in quality, agility and cost factors in manufacturing. Environmentally sustainable manufacturing technologies, increased customer expectations and rapid response to customers need, call for constant technological innovations in manufacturing. AIMTDR conferences have been covering many such areas for discussion and publication of such research papers thus making it a dynamic conference changing with time to encompass the needs of the user industries.

This special issue on Advanced Manufacturing Technologies consists some of the papers of the 1st International and 22nd All India Manufacturing Technology Design and Research (AIMTDR) Conference held at Indian Institute of Technology (IIT) Roorkee (India). In this conference, the papers related to various manufacturing technologies such as casting, forging, machining, inspection, metrology, etc. and manufacturing systems, namely, Computer Integrated Manufacturing Systems, Flexible Manufacturing Systems, Cellular Manufacturing, Just-In-Time, Concurrent Engineering and so on, were presented. In the past one decade or so, many new areas have rapidly emerged especially under the umbrella of nano-technology. Computational Manufacturing

had been the area of research interest of many researchers since long time. Some of the very new areas that also have been covered by this AIMTDR conference include Web Manufacturing, Supply Chain Management, Green Manufacturing and Intelligent Manufacturing Systems.

2 Inside this special issue

Out of about 150 papers, there were about 25 papers that were recommended by the technical committee based on the reviewers' comments for the publication in this journal (IJMTM). Out of these 25 papers, only 15 have been accepted after their re-reviewing process done by the internationally renowned reviewers. Out of these 15 accepted papers, seven belong to the area of advanced machining processes, four to the traditional machining and grinding processes, one each for casting, robot, assembly line and metal matrix composites. Following paragraphs enumerate the highlights of the contents of the research papers in this special issue.

The first paper by Jha and Jain deals with a novel nanofinishing process named as 'Magnetorheological Abrasive Flow Finishing (MRAFF)', which can produce surface finish on stainless steel as low as 30 nm. It can go lower than 10 nm with the optimum combination of finishing parameters, abrasive, and electromagnets. Authors have found Casson's fluid model closely representing the MRF fluid owing to non-linear shear thinning behaviour.

Three papers deal with the application of laser beam in manufacturing. One of these papers by Kuar et al. deals with optimisation of micromachining parameters using Response Surface Methodology (RSM). They considered the following machining parameters: pulse frequency, pulse width, current and assist air pressure. The second paper by Doloi et al. reports the modelling and analysis of machining characteristics during pulsed Nd:YAG laser microgrooving of Al_2TiO_5 . This paper also used RSM for optimisation, which has its own limitations. They have found optimum machining parameters for achieving minimum taper angle of a micro-groove, which is reported to be quite high (11.1°). Third paper in this area of laser micromachining deals with the application of KrF excimer laser micromachining of silicon wafer in air and water medium by Das and Saha. Qualitative and quantitative studies have been carried out from the micrographs of the different machined spots. The differences between laser ablation in water and air have been enumerated. Such developments would have far-reaching consequences in underwater micromachining of metals and non-metals.

One paper on Electro-Chemical Micro-Machining (ECMM) by Munda et al. deals with the evaluation of the effects of the parameters on the radial overcut using RSM approach. They have reported machining parameters for minimum radial overcut. One of the two papers on EDM reports the application of abrasive powder mixed dielectric using copper tool and aluminium MMC as workpiece material. Singh et al. claim that the addition of abrasive powder effectively improves MRR and surface roughness when compared with the use of the same dielectric without abrasive power. Second paper on EDM by Patowari et al. deals with surface modification of C-40 P/M green compact electrodes used in EDM. Taguchi method has been used for design of experiments. They found the optimum conditions to get an uniform layer over the work surface using overall evaluation criterion.

Next four papers present the research findings related to the traditional metal cutting and grinding. Chelladurai et al. report the cutting tool condition monitoring system for high-speed turning operation. Its use would result in better accuracy and higher productivity. Another paper on condition monitoring (by Arunachalam and Ramamoorthy) deals with grinding wheel condition monitoring using machine vision. In this paper, the Fourier power spectrum based texture parameters are evaluated and used for discriminating the grinding wheel condition. This method can be extended for online condition monitoring of grinding wheel and development of an automated dressing system using machine vision. Next paper by Ramu et al. deals with drill geometry optimisation for burr minimisation. Burr minimisation helps in faster burr removal. Based on the experimental results, empirical model has been developed that would help in deciding the drilling parameters for burr elimination minimisation. The last paper in the traditional cutting by Ramesh et al. deals with tool life enhancement through nano-composite coating of the cutting faces. This interesting paper reports that the tool life can be extended from 5 to 10 times more than the tool life of conventional carbide tools.

The next paper studies the effect of injection parameters on the dimensional accuracy of wax patterns used in ceramic shell investment casting. The authors (Balwinder et al.) planned the experiments following 'one variable at a time' approach. It is found that slow injection and short holding time minimises dimensional variation. Madhab et al. present a kinematic model for a biologically inspired micro-gripper. The mathematical model is employed to simulate the process using MATLAB/SIMULINK. Venkatesh and Dabade report a study of the effect of four factors (no. of workstations, no. of models, demand pattern and stochastic variability) on the performance measures used for representing the operational objectives. The last paper of this issue authored by Srivastava et al. reports the effect of imperfect interfaces on elasto-thermodynamic damping of fibre-reinforced MMCs.

From the above narration of the papers in this special issue, it is evident that a large spectrum of research areas related to the manufacturing technology design and research have been covered in this special issue of IJMTM. I hope this special issue will be useful to the researchers working in these areas.

Acknowledgements

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I thank the reviewers from the different parts of the world who have cooperated and helped in timely completing the review process, which sets the standard of the papers published in such special issues. Last but not the least, I thank the organisers (specially Professor P.K. Jain and Professor N.K. Mehta of IIT Roorkee) of the 1st International and 22nd AIMTDR Conference who gave me the responsibility for arranging this special issue of IJMTM for publishing the selected papers of the conference.