
Editorial

Posinasetti Nageswara Rao*

Department of Technology,
University of Northern Iowa,
Cedar Falls, IA 50614-0178, USA
Email: posinasetti.rao@uni.edu
*Corresponding author

Mamidala Ramulu

Department of Mechanical Engineering,
University of Washington,
P.O. Box 352600, Seattle WA 98195, USA
Email: ramulum@uw.edu

Govind Sharan Dangayach

Department of Mechanical Engineering,
Malaviya National Institute of Technology,
JLN Marg, Jaipur 302017, India
Email: gsdangayach.mech@mnit.ac.in

Biographical notes: Posinasetti Nageswara Rao is currently a Manufacturing Engineering Technology Professor in The University of Northern Iowa, Cedar Falls, USA in the Department of Technology. His active areas of teaching and research are manufacturing engineering and design engineering. He has received the ‘Distinguished Scholar’ award from The University of Northern Iowa for the year 2017–2018. He has authored a number of textbooks on manufacturing technology, CAD/CAM and metal casting, published by McGraw Hill India and American Foundry Society. He has wide interaction with the industry through the process of consultancy work and conducting continuing education programs on various aspects related to modern manufacturing. He has also published over 260 research papers in international conferences and journals. He is on the editorial boards of *International Journal of Precision Technology*, *International Journal of Mechanical Engineering*, *Efficient Manufacturing*, *International Journal on Global Research in Science and Technology*, and *West Indian Journal of Engineering*.

Mamidala Ramulu is a Boeing-Pennell Professor of Engineering and Professor in Mechanical Engineering, and Adjunctive Professor of Industrial and Systems Engineering and Material Science and Engineering. He is engaged both in teaching and research for the past 38 years at University of Washington, Seattle WA, USA. He received his BE (1974) from Osmania University, MTech (1977) from IIT New Delhi, India and PhD (1982) from University of Washington. His professional contributions reflect multi-disciplinary technical leadership in advanced aerospace materials, mechanics and manufacturing engineering. He has published more than 450 technical papers covering these fields in refereed journals and conference proceedings. He is a Fellow of ASME, SEM, ASM International and SME.

Govind Sharan Dangayach is the Dean, Planning and Development, and Professor in Department of Mechanical Engineering in Malaviya National Institute of Technology (MNIT), Jaipur. He has published several research papers in various International/National Journals and conferences. He is the Editor-in-Chief of *Journal of Manufacturing Technology Research (An International Journal)*. He is an Associate Editor of *International Journal of Business Systems Research (IJBSR)*, and *International Journal of Global Business Competitiveness (IJGBC)*. He is Guest Editor of three international journals viz. *Production Planning & Control (PPC)*, *International Journal of Manufacturing Technology & Management (IJMTM)*, *International Journal of Business Performance Management (IJBPM)*. He is a Visiting Professor at DHBW Mosbach, Germany, Asian Institute of Technology (AIT) Bangkok, IIM Khozikode, and IIM Shillong. He is a resource person/expert of AICTE, UPSC and NBA Government of India. He was the Chairman of The Institution of Engineers India, Rajasthan State Centre for the session 2014–2016.

The current rate at which humans are utilising the earth resources is not sustainable and it is affecting the environment in a number of ways. Responsible behaviour for humans is to utilise the available resources in a way that the environment will not be affected so that future generations will enjoy the same quality of life and resources that the current generation is having. Manufacturing being a very resource consuming activity, it is important to consider sustainability at all levels of the life cycle of the products that are being manufactured. In order to achieve sustainability in precision machining it is necessary to use life cycle assessment (LCA) at all stages of the precision manufactured products. LCA allows to identify the environmental impact of the manufacturing processes by identifying the root causes where there is a possibility of improving the performance by reducing the resource and energy consumption.

This special issue has selected a total of eight papers with the sustainable manufacturing theme to highlight the current state of research in the area involving the reduction in energy requirement for precision manufacturing processes and practices, as well as using materials that are more environment friendly. All these papers are from diverse fields of precision manufacturing technology with the underlying theme of sustainability.

Banerjee and Sharma presented a review paper on the minimum quantity lubrication (MQL) in machining concentrating on the localised and multi-point aerosol application. Of late MQL has become an important topic of research in sustainable manufacturing particularly because of the possible implication in machining as the cutting fluids account for a large part of the machining economics and are often neglected. Within MQL literature, the direction in which the aerosol jet is applied is not widely reported and as it makes a marked effect on the success or failure of the application, this paper attempts to consolidate that knowledge in one place so that future researchers will be able to take it into account. By virtue of the detailed literature survey the authors are able to provide significant conclusions on the status of current MQL research. It is possible to minimise the consumption of the cutting fluid by adopting appropriate direction for the mist.

Kumar and Karunakar have proposed a modification to the composition of the shell coat used in precision investment casting process of Al-Si alloys such that quality castings be produced. The suggested modification improved the porosity of the inner and outer coatings thereby enhancing the permeability of the shell considerably that would improve the casting produced. They also studied the effect of shell thickness and firing

temperature on properties of modified ceramic shell for precision casting of Al-Si alloys. They showed that by controlling the shell thickness and the firing temperature the grain structure and the surface finish of the produced casting could be controlled.

Viswanth, Ramanujam and Rajyalakshmi have studied the use of vegetable and renewable fluid based dielectrics for the electric discharge machining (EDM) process such that productivity be improved along with the sustainability during the machining of AISI 2507 super duplex stainless steel. They selected Pongamia oil (also called Karanja oil) and Neem oil. Both these oils are non-edible and as such will not affect the food chain sustainability. After trans-esterification, these oils have been used as dielectrics because of their superior characteristics compared to the commercially available hydrocarbon-based EDM oils. They showed that these oils have improved the material removal rate as well as surface finish compared to the commercial oils.

Yadav, Gaurav, Mistry, Dangayach and Kumar have conducted a bibliometric analysis of research on sustainable manufacturing with the aim to understand the current publications that are influencing the research in sustainable manufacturing. Bibliometric methods originally used in the field of library and information science are now adopted in technical and medical fields as well. By using the Web of Science core collection and Scopus databases the authors have provided author analysis, discipline-wise analysis, source analysis, country analysis, institution-wise analysis and cluster analysis of author keywords thereby providing an idea of the more influential instances in the publications. Based on this analysis the authors provided the promising research directions in sustainable manufacturing.

Choudhury, Dutta and Debnath have studied the micro-drilling behaviour of the green composite composed of bamboo fibre and polylactic acid (PLA) using experimental methodology. The use of biodegradable composite is most welcome as alternative to the difficulty of recycling and biodegradability of the conventional composites. Particularly suitable for biomedical applications, these materials require micro-drilling for fabrication of appliances. They have used experimental research with Response Surface Methodology to optimise the parameters for reducing the delamination during the entry and exit for micro-drilling.

Sahu, Bhanot and Mahanta have utilised the DEFORM-3D simulation software to conduct an experimental study to minimise the resources used for the turning of Al6061 alloys. Machining operations require multiple objectives in order to simulate the realistic industrial scenarios. The authors have used grey relational analysis to convert multi responses parameters to a single response for optimising the process parameters.

Sodhi, Bhanot, and Verma have presented a paper on bio machining of aluminium alloy 4004 using *Acidithiobacillus ferrooxidans* and *Aspergillus niger*. At this time, bio machining actually provides extremely low material removal rates that are not in the same league as the conventional processes, but is an excellent opportunity to examine it as a sustainable manufacturing operation in view of all the advantages that it has. They have experimentally established the process and found the optimum process parameters to improve the performance.

Das discussed about green supply chains that can be analysed with robust models by taking into account all the contributions of green factors and resilient criteria in all phases of a supply chain. In doing so, he provided a green and resilient supply chain design model that includes supply, manufacturing, remanufacturing and distribution processes and can be applied to a number of products. The formulated mathematical model of the supply chain is used to develop a sustainability improvement model as an objective

function and provided methodology to evaluate the sustainability indicators. He then explained it with the help of a numerical example.

We would like to thank all the authors for considering this special issue as an outlet to publish their research results, and thank all the reviewers for their efforts and constructive feedback to the authors that greatly improved the quality and relevance of the papers for the research community. We appreciate the support and advice that the Editor-in-Chief, Dr. Vijay Kumar Jain, has given us in preparing this special issue. We also thank the staff at Inderscience, in particular Ms. Alexandra Starkie for their help in finalising this special issue.