Journal of Cleaner Production 87 (2015) 7–10

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Call for papers

Call for papers for a special volume on Advanced Manufacturing for Sustainability and Low Fossil Carbon Emissions

Mingzhou Jin [a, b, *], Renzhong Tang [b], Donald Huisingh [c]

[a] Department of Industrial and Systems Engineering, University of Tennessee, Knoxville, TN, USA
[b] Industrial Engineering Center, Zhejiang University, Hangzhou, Zhejiang, China
[c] Institute for a Secure and Sustainable Environment, University of Tennessee, Knoxville, TN, USA

The industrial sector consumed about 19% of the total societal energy and contributed 30% of the total global greenhouse gas (GHS) emissions in 2010 based on a recent report from the Intergovernmental Panel on Climate Change report (IPCC, 2014; Bajželj et al., 2013). Manufacturing is responsible for about 98% of the total direct CO_2 emissions from the industrial sector (IEA, 2012a, 2012b). Finding better ways to reduce energy consumption and waste emissions in manufacturing processes is therefore, critical to achieving energy savings and emissions reductions. This is essential to enhance the sustainability of our society. Additionally, the IPCC report highlighted that the lack of acceptance of unconventional advanced manufacturing processes, is a major barrier for reducing energy consumption and emissions.

Advanced manufacturing focuses on the coordination of information, automation, computation, software, sensing, and networking in manufacturing (PCAST, 2011). Advanced manufacturing uses cutting edge materials and emerging technologies (e.g., additive manufacturing and digital manufacturing) and is expected to be crucial not only for the economic competitiveness of manufacturers at a global scope but also for the sustainability of the industrial sector. The digital manufacturing and additive processes reduce manufacturing material's wastes compared to traditional subtractive manufacturing and avoid producing products for which there is no customer.

In the whole life-cycle of products, the manufacturing process is one of the most energy consumptive and waste emissions producing segments. New materials and technologies of advanced manufacturing require new manufacturing processes and new analytical and simulation models for process controls and parameter optimization with regard to cost, quality, product flexibility, energy consumption, and fossil carbon emission reductions. Those new processes are expected to fundamentally transform manufacturing systems, including facility design, process planning, scheduling, material handling, workforce planning, quality control, and inventory management. Furthermore, the effectiveness of adopting advanced manufacturing can only be maximized by following a holistic systems approach from product conceptualization, product design and manufacturing to product delivery and service for the customers as well as in the management of the used products at the end of their useful lifetimes. This will require innovations and improvements in forward and reverse supply chain management, which are designed to catalyze system's changes from labor-intensive and capital-intensive traditional manufacturing to information-based advanced manufacturing.

The trend of advanced manufacturing coincides with the acceleration of innovations in global supply-chain management. New materials and processes require new supply chain designs and operations. Supply-chain networks and mechanisms should be retuned to further encourage information sharing among enterprises to make manufacturing processes more distributed, decentralized and collaborative. Very soon, advanced manufacturing will become increasingly globally linked as digital supply-chain management evolves and becomes the norm across enterprise systems (IDA, 2012). Additionally, wide adoption of advanced manufacturing could make supply chains more responsive and cost efficient. Rather than shipping physical products, designs could be shared digitally so that large amounts of energy consumption and emissions during freight transport could be saved. Additive manufacturing could significantly reduce the lead-time for obtaining products and parts with high customization and great variety and therefore facilitate just-in-time or nearly just-in-time systems, which can reduce inventory levels and supply chain risks. The resultant flexibility brought by advanced manufacturing will help to tailor supply chains to respond to fast-evolving and more personalized customer needs. The interactions between advanced manufacturing and supply-chain management needs to be researched together in order to achieve optimal sustainability benefits.

In order to fully understand and maximize the potential of advanced manufacturing to save energy and resources, systematic approaches, which consider all stages of product life-cycles, multiple functions within enterprises, and supply-chain management across enterprises is necessary. This Special Volume (SV) of the

* Corresponding author. Department of Industrial and Systems Engineering, University of Tennessee, 525D John D. Tickle Engineering Building, 851 Neyland Drive, Knoxville, TN 37996, USA. Tel.: +1 865 974 9992.
E-mail addresses: jin@utk.edu, mingzhou.jin@gmail.com (M. Jin).

http://dx.doi.org/10.1016/j.jclepro.2014.09.063
0959-6526

Journal of Cleaner Production (JCLP) was designed to enhance and to promote societal sustainability and the low-fossil carbon economy, which can result from integration of advanced manufacturing at all stages along product life cycles, including design, process, planning, supply chain management, delivery, and service. The Guest Editors (GEs) welcome literature reviews, research papers, and case studies that include but are not restricted to the following topics.

Theme 1: design theory and methodology for sustainability with advanced manufacturing

Considering environmental factors and other externalities in developing new technical products and systems is critical for the sustainability of advanced manufacturing (Waage, 2007; Maxwell and Van der Vorst, 2003). This task is inherently challenging because the traditional starting point of product design is based upon customer requirements without considering environmental requirements. During the past decade there has been dramatic growth in environment-considered design, such as eco-design, design for environment, and design for sustainability (Bovea and Pérez-Belis, 2012). The base of engineering design has been extended to cover environmental factors (Mont, 2002), such as generalized function definitions instead of technical function definitions. However, there is still a lack of practical design methods for directly guiding product design using both customer and environmental requirements as starting points. Topics of interest in this theme include but are not limited to:

- Assessing affordability-based design methodologies that consider environmental factors for advanced manufacturing;
- Designing and applying decision-support models, which consider environmental requirements in supply chains;
- Incorporating environmental requirement modeling, elicitation and evaluation in engineering design;
- Incorporating of uncertainty in analyzing environmental requirements;
- Implementing environmentally friendly innovative design;
- Integrating systematic approaches for meeting customer's needs and environmental requirements;
- Implementing design for diverse customer usage requirements;
- Implementing design for remanufacturing, recycling and recovery.

Theme 2: energy efficiency assessment and control of mechanical manufacturing systems

The traditional mechanical manufacturing systems (MMS) use enormous amounts of energy throughout many industrial sectors while their efficiency is very low (Wang et al., 2013). As a result, it is imperative to improve energy efficiency in MMS (Duflou et al., 2012; Salonitis and Ball, 2013). Improved energy efficiency assessment, control and better management are required for improving energy efficiency for manufacturing processes, including advanced manufacturing. However, the energy consumption of a manufacturing system has a series of characteristics, such as a large number of energy sources, complex energy flows, huge dynamic changes and diverse impacts. As a result, it is challenging to evaluate, manage and ensure improvements in energy efficiency. Consequently, innovative and practical assessment and control methods are urgently needed. The emerging and rapidly-developing advanced manufacturing approaches lack energy efficiency assessment methods. For this reason, authors are invited to submit papers about energy efficiency assessment and control, especially for advanced manufacturing. Topics of interest in this theme include but are not limited to:

- Improving energy-efficiency in MMS with advanced manufacturing processes;
- Developing, testing and implementation an effective index systems for energy efficiency evaluation;
- Implementing real-time energy efficiency assessment of components and systems;
- Integrating online acquisition of energy efficiency data with system's feedback learning loops;
- Establishing and monitoring progress in achieving energy consumption and energy efficiency improvement quotas or targets in manufacturing processes.

Theme 3: parameter optimization for advanced manufacturing and remanufacturing

Within this theme the SV team welcomes papers, which apply optimization techniques using resource, cost and performance as objectives to achieve evidence-based resource/cost/performance trade-off analyses of advanced manufacturing processes. This theme will also focus on three inter-connected components for remanufacturing. 1) The parameters used in novel process technologies for transforming scrap are optimized to maximize the quantity and quality of material recovery with minimum resources and costs. 2) The parameters of the remanufacturing processes are optimized to ensure quality assurance of remanufactured products. 3) The design and re-manufacturing processes of the remanufactured products are considered concurrently to maximize energy and material's efficiency. Topics of interest in this theme include but are not limited to:

- Optimizing the design and advanced manufacturing processes for optimizing energy and material's efficiency;
- Optimizing process technologies for transforming scrap into reusable raw materials;
- Optimizing remanufacturing processes;
- Optimizing techniques for low fossil-carbon and sustainability applications;
- Testing, improving and implementing decision-support systems for evidence-based resource/cost/performance trade-off analyses of advanced manufacturing and remanufacturing;
- Developing in-depth case studies on manufacturing process optimization for low fossil-carbon and sustainability applications.

Theme 4: low fossil-carbon process planning and production scheduling

Process planning and production scheduling, which link product design and manufacturing, are two of the most important functions in modern manufacturing processes. A process plan specifies what manufacturing resources and technical operations/routes are needed to produce a product. With the process plans of jobs as inputs, a production task is required to effectively schedule the operations of all jobs on machines without violating the job precedence relationships specified in the process plans. Both impact the performance of the modern manufacturing system, especially in energy consumption and production of waste emissions. In recent decades, many research publications have dealt with these functions. However, few authors simultaneously considered low fossil-carbon and sustainability (Shrouf et al., 2014; Kant and Sangwan, 2014).

Advanced manufacturing often involves new materials and manufacturing processes and requires new models for planning and scheduling but not low fossil-carbon and sustainability. Therefore, topics of interest within this theme include but are not limited to:

- Optimizing process planning and process scheduling for advanced manufacturing, especially in the context of low fossil-carbon and sustainability dimensions;
- Optimizing manufacturing systems under multiple sustainability criteria, such as economic feasibility, fossil-carbon emissions, and energy consumption;
- Monitoring and reducing the fossil-carbon energy footprints in advanced manufacturing process planning and production scheduling.

Theme 5: integration of supply-chain innovations and advanced manufacturing

Supply chain innovations, such as enterprise resource planning, electronic data exchange, and the adoption of the radio frequency identification (RFID) in logistics, have contributed to the complexity and globalization of the current economy (Zelbst et al., 2010). Advanced manufacturing is expected not only to change processes within a single enterprise but also to transform supply chains across global enterprises. The distributed manufacturing processes could significantly reduce the physical flows of products, which cause massive energy consumption and fossil-carbon emissions in freight transportation. The reduced procurement lead times and higher flexibility provided by advanced manufacturing can help supply chain managers to reduce inventory levels while providing high responsiveness to their customer needs. The rapid delivery provided by advanced manufacturing could also improve the robustness of supply chains to respond to disruptions. All of these fundamental changes require systematic investigations into the interactions between supply-chain innovations and advanced manufacturing (IDA, 2012). Topics of interest in this theme include but are not limited to:

- Developing, testing and applying new analytical and simulation models for supply-chain network design, management, and coordination for advanced manufacturing;
- Documenting the impacts of advanced manufacturing on logistics management;
- Integrating models for real-time optimization of advanced manufacturing processes and their associated supply chains to optimize their economic, human health and environmental sustainability benefits.

Theme 6: sustainable innovation for product-service systems

Manufacturers are increasingly becoming service providers and some of them have successfully gained environmental and financial benefits from their product-service operations. Thus, the concept named Product-Service Systems (PSS) has received increased attention. The goal of PSS is to offer customers with “physical products and/or services”, which can reach environment optimization, energy saving and value-added services. Sustainable innovation for PSS takes all aspects of sustainable development into account, in particular the environmental, economic, and social factors. It is necessary to perform research on how to develop, implement and monitor sustainable models for PSS, and on how sustainable design methods and tools can be integrated into PSS to deliver sustainability. Advanced manufacturing may bring the service level of PSS to new dimensions and create additional values to customers and to the companies. Topics of interest in this theme include but are not limited to:

- Developing, implementing and monitoring modular development processes, methods and platforms for PSS toward sustainability;
- Achieving greater sustainability through PSS, which benefit from a thorough application of sustainable design processes and toolkits;
- Engaging in business modeling, organizational modeling, and operational mechanism construction to support the integration of PSS;
- Determining the economic aspects of PSS by utilizing total cost accounting and other tools to determine the costs and benefits of different types of PSS;
- Integrating PSS knowledge management to better explore how knowledge can be generated and used for enhancing the quality of decision-making processes.

Tentative schedule for the development of this SV

- Call for papers (CfPs) issued during October 2014.
- Submission of 500-word, extended abstracts to Mingzhou Jin (jin@utk.edu) by February 28, 2015.
- The selected authors will be invited to develop full, peer review-ready papers by March 15, 2015.
- The invited authors will be expected to submit their ‘peer-review ready’ documents to Elsevier via the EES system by July 30, 2015.
- Peer review/paper revision process will be performed from August 2015 to November 30, 2015.
- Submission of the final versions of revised papers by December 31, 2015.
- Authors will be informed of the need for minor revisions by January 30, 2016.
- Deadline for revisions of all papers, including the introductory paper for the SV submitted and in the corrected proof phase by March 15, 2016
- Publication of this SV projected to be during May 2016.

Paper submission

Authors should select **‘Advanced Manufacturing’** as the article type for this “SV on Advanced Manufacturing for Sustainability and Low Fossil Carbon Emissions,” when they wish to submit their manuscript to Elsevier's EES system.

Authors are invited to submit different types of papers for potential publication in this Special Volume. Papers should be between 9000 and 12,000 words for ‘comprehensive reviews,’ between 7000 and 8500 words for ‘theoretical papers based upon empirical studies’ and between 5000 and 7000 words for ‘case studies’.

Papers must be written in good English. Authors with limitations in the command of written English are recommended to have their papers edited by a Native English Science Editor before the first submission because poorly written pieces can compromise the decisions during the review process. Similarly, they should have their final document edited by a Native English Science Editor before they submit it to the editorial team for the final review and for publication within the Journal of Cleaner Production.

All authors must follow the editorial guidelines provided in the instructions for authors for the Journal of Cleaner Production, which can be accessed via the website: http://www.elsevier.com/journals/journal-ofcleaner-production/0959-6526/guide-for-authors. Authors should submit their manuscripts in MSWord to http://ees.elsevier.com/jclepro/.

By submitting a manuscript, the author(s) must certify that the contribution is original and has not been published or is not under consideration for publication elsewhere and that no part of the material breaches the copyrights of others. All articles will be first evaluated by the editors of this SV to ensure suitability with the scope of both the SV and of the JCLP. After the first screening, suitable papers will be submitted to a single blind, peer review process according to the standards of the JCLP. The review/revision process may need to be repeated several times for many articles to ensure that all authors or author teams achieve top quality manuscripts.

Guest Editors

Dr. Mingzhou Jin, Department of Industrial and Systems Engineering, University of Tennessee, 525D John D. Tickle Engineering Building, 851 Neyland Drive, Knoxville, TN, USA, 37996, jin@utk.edu.

Dr. Renzhong Tang, Industrial Engineering Center, Zhejiang University, Hangzhou, Zhejiang, China, tangrz@zju.edu.cn.

Associate Guest Editors

Dr. Yangjian Ji, Industrial Engineering Center, Zhejiang University, Hangzhou, Zhejiang, China.

Dr. Fei Liu, Institute of Manufacturing Engineering, Chongqing University, China.

Professor Ashutosh Tiwari, Manufacturing Department, Cranfield University, UK.

Dr. Suresh Babu, Advanced Manufacturing, Oak Ridge National Lab and University of Tennessee, USA.

Dr. Liang Gao, the Department of Industrial & Manufacturing Systems Engineering, Huazhong University of Science and Technology, China.

Editor-in-Chief of the Journal of Cleaner Production

Authors may also confer with the 'Editor-in-Chief' of the Journal of Cleaner Production Professor Dr. Donald Huisingh, University of Tennessee, Knoxville, TN, USA donaldhuisingh@comcast.net.

References

Bajželj, B., Allwood, J.M., Cullen, J.M., 2013. Designing climate change mitigation plans that add up. Environ. Sci. Technol. 47, 8062–8069.
Bovea, M.D., Pérez-Belis, V., 2012. A taxonomy of ecodesign tools for integrating environmental requirements into the product design process. J. Clean. Prod. 20, 61–71.
Duflou, J., Sutherland, J., Dornfeld, D., 2012. Towards energy and resource efficient manufacturing: a processes and systems approach. CIRP Ann. Manuf. Technol. 61, 587–609.
IDA, 2012. Emerging Global Trends in Advanced Manufacturing. Institute for Defense Analysis, Alexandria, VA, USA.
IEA, 2012a. Energy Balances of OECD Countries. International Energy Agency, Paris.
IEA, 2012b. Energy Balances of Non OECD Countries. International Energy Agency, Paris.
IPCC, 2014. Fifth Assessment Report (AR5) Climate Change 2014: Mitigation of Climate Change. Intergovernmental Panel on Climate Change.
Kant, G., Sangwan, K.S., 2014. Prediction and optimization of machining parameters for minimizing power consumption and surface roughness in machining. J. Clean. Prod. 83, 151–164.
Maxwell, D., Van der Vorst, R., 2003. Developing sustainable products and services. J. Clean. Prod. 11, 883–895.
Mont, O.K., 2002. Clarifying the concept of product–service systems. J. Clean. Prod. 10, 237–245.
PCAST, 2011. Report to the President on Ensuring American Leadership in Advanced Manufacturing. President's Council of Advisors on Science and Technology.
Salonitis, K., Ball, P., 2013. Energy efficient manufacturing from machine tools to manufacturing systems. Procedia CIRP 7, 634–639.
Shrouf, F., Mere, J.O., Sanchez, A.G., Mier, M.O., 2014. Optimizing the production scheduling of a single machine to minimize total energy consumption costs. J. Clean. Prod. 67, 197–207.
Waage, S.A., 2007. Re-considering product design: a practical "road-map" for integration of sustainability issues. J. Clean. Prod. 15, 638–649.
Wang, Q., Liu, F., Li, C., 2013. An integrated method for assessing the energy efficiency of machining workshop. J. Clean. Prod. 52, 122–133.
Zelbst, P.J., Green, K.W., Sower, V.E., Baker, G., 2010. RFID utilization and information sharing: the impact on supply chain performance. J. Bus. Ind. Mark. 25, 582–589.