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## Special issue: Manufacturing engineering management

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Numerous manufacturing engineering management problems have emerged and attracted great attention in academia and practice, especially in high-end equipment manufacturing field with the development of the Internet and big data technology in recent years. Therefore, investigations on manufacturing engineering management technology, theoretical methods, and opportunities and challenges in the new technological environment are essential. The increasing number of relevant studies from theoretical researchers and practical engineers attempted to construct a scientific and reasonable system of manufacturing engineering management based on the Internet and big data technology.

This issue aims to solve key scientific problems in which the Internet and big data technology are deeply integrated into the manufacturing industry. Moreover, this special issue focuses on the engineering management issues involved in the research and development, production, service, and remanufacturing of high-end equipment on the basis of the theories and methods of optimization and decision making, information management, organization management, quality management, cost management, risk management, and life cycle assessment in high-end equipment manufacturing engineering. To construct an innovation system of high-end equipment manufacturing engineering management based on the Internet and big data technology, this special issue covers research on decision making, planning, organization, command, coordination, and control of all resources involved in high-end equipment manufacturing engineering.

This special issue has attracted extensive attention from numerous researchers worldwide after the Call-for-Paper was announced in September 2017. After a strict review, only the following papers were finally accepted for publication. Detailed information is given below.

Yang et al. systematically review the current research on engineering management for high-end equipment intelligent manufacturing issues under the new-generation information technology environment, including cross-lifecycle management, network collaboration management, task integration management of innovative developments, operation optimization of smart factories, quality and reliability management, information management and intelligent decision-making. In addition, they summarize and discuss the challenges of these issues and potential research opportunities.

Glover et al. study the uncapacitated facility location problem to minimize the combined costs of selecting facilities and assigning customers. They propose a simple multi-wave algorithm (MWA) that integrates tabu search and strategic oscillation. In their algorithm, the vertical and horizontal phases keep alternating until reaching a boundary solution, after which parameters are updated. Experimental tests prove that the MWA algorithm outperforms nine state-of-the-art methods.

Brunaud et al. present a novel decomposition scheme in the study of product decomposition in supply chain planning. The new approach allows for simultaneous decomposition by products and time periods, thereby enabling the generation of a large number of sub-problems, with the potential benefit of using parallel computing. They perform a case study and demonstrate that temporal decomposition is more efficient than the other decomposition.

Tan et al. propose a method of analyzing customer requirements based on open source data. They extract user opinions from preprocessed online data based on the defined template and users' sentiments, and discover the

parameter range that satisfies customers according to the relationship between users' sentiments and attribute parameters. The proposed method is evaluated by an example of new energy vehicle, which verifies its availability and feasibility.

Liu et al. investigate the energy-aware flow shop scheduling problem with a time-dependent learning effect to minimize total energy consumption. They design a bounds-based nested partition (BBNP) solution and a branch-and-bound algorithm using composite lower bounds. Computational experiments reveal that BBNP has better performance than conventional heuristics, and composite bounds offer great computational advantage.

Damir et al. design a special conflict graph to investigate the problem of planning of freight railway transportation to find the maximum independent set of vertices in the undirected graph. They present an approximate algorithm and its modification to obtain the lower and upper bounds for the number of vertices.

Liu et al. study the scheduling problems of a semiconductor manufacturing system with uncertain processing time. A novel slack-based robust scheduling rule (SR) based on the analysis of robustness measurement is proposed for enhanced robustness of the scheduling scheme. The simulation results show that the proposed SR can effectively improve the robustness of the scheduling scheme with a slight loss in performance.

Pardalos and Fathi study some global optimization methods that can be applied in smart manufacturing. They research the decomposition techniques and classify the global optimization problems based on objective function representation and decomposition techniques. Moreover, they explain Kolmogorov's superposition and its application in global optimization and conclude with solving the maximum degree-concentrated fault-tolerant spanning subgraph problem by DC programming.

Zhao et al. propose a Bayes model to estimate the residual life of products by fusing expert knowledge, degradation data, and lifetime data. They model degradation data using the linear Wiener process, describe lifetime data by the inverse Gauss distribution, and analyze different types of expert knowledge via the maximum entropy method. The Monte Carlo Markov chain is applied to draw samples of the parameters and estimate the residual life of products. They demonstrate the effectiveness and practicability of this method by a numerical example and prove the accuracy and correctness by simulation experiments.

Cisneros-Saldana et al. propose a network-based model to address the problem of finding appropriate locations for wind farms that maximize the overall energy output while controlling the effects of wind speed variability. Real-life wind speed data are utilized to demonstrate the advantages of the proposed approach.

We extract the ideas of some young scholars from different fields worldwide on the issue that whether machines completely replace humans in the manufacturing process.

With regard to super engineering, the innovation practice of the manufacturing engineering management in China's high-speed rail industry is introduced. China has completed the construction of a high-speed rail industry system through the development strategy of indigenous R&D, introduction and absorption, and indigenous innovation. The key player of China's high-speed rail industry, CCRC, has leveraged the global competitiveness and output its product and manufacturing capabilities all over the world.

Finally, we are extremely grateful to all the authors for contributing their valuable studies to this special issue. We also sincerely thank the editor-in-chief and all the reviewers for their support in the organizational process and special attention in improving the papers for this issue.

*Guest Editors-in-Chief*

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He has won two second class prizes for State Scientific and Technological Progress Award, six first class prizes for provincial and ministerial level science and technology award, and one first class prize for Science and Technology Award of Chinese Ministry of Education. He has published five academic works and more than 400 papers in important journals and international conferences worldwide. He has also obtained three second

class prizes of the National Teaching Achievement Award, National Higher Education Teacher Award in 2008, National Labor Medal in 2014, Outstanding Contribution Award of Fudan Management in 2015, and National Innovation Award in 2017.

His main academic positions are as follows: editor-in-chief of the *Management Science and Engineering* Volume of Encyclopaedia of China (3rd edition); convenor of the Management Science and Engineering Disciplinary Evaluation Group of the Academic Degrees Committee of the State Council; deputy director of the Strategic Consulting Committee and executive deputy director of Management Division in Ministry of Education; vice president of the China Quality Association; joint president of the Chinese Research Council of Management Modernization; commissioner of the Industrial Engineering Committee for Chinese Mechanical Engineering Society; vice president of the Chinese Society of Optimization, Overall Planning, and Economic Mathematics; and editor-in-chief of the journal *Forecasting*.



Panos M. Pardalos serves as distinguished professor of Industrial and Systems Engineering at the University of Florida. In addition, he is the Paul and Heidi Brown preeminent professor in Industrial & Systems Engineering. He is also an affiliated faculty member of the Computer and Information Science Department, Hellenic Studies Center, and Biomedical Engineering Program. Moreover, he is the director of the Center for Applied Optimization. His recent research interests include network design problems, optimization in telecommunications, e-commerce, data mining, biomedical applications, and massive computing.

Professor Pardalos has received numerous awards and honors, which include Constantin Carathéodory Prize; 2013 EURO Gold Medal; Honorary Doctor of Science Degree, Wilfrid Laurier University; 2007 Senior Fulbright Specialist Award; Honorary Member of the Mongolian Academy of Sciences; Degree of Honorary Doctor, N.I. Lobachevski State University of Nizhni Novgorod, Russia; Fellow of the American Association for the Advancement of Science and American Institute for Medical and Biological Engineering; Foreign Member of the National Academy of Sciences of Ukraine, "Petrovskaya Academy of Sciences and Arts," Russia, and "Lithuanian Academy of Sciences."

He was the founding editor and editor-in-chief of the Journal of *Global Optimization and Optimization Letters*. He is currently the editor-in-chief of the journals "*Energy Systems*" and "*Computational Management Science*." He also serves as a member of the editorial board of numerous internally highly reputable scholarly journals.



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