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Editorial

Advances in Sustainable and Digitalized Factories: Manufacturing, Measuring Technologies and Systems

Roque Calvo [1,*], José A. Yagüe-Fabra [2] and Guido Tosello [3]

[1] Department of Mechanical, Chemical and Industrial Design Engineering, Universidad Politécnica de Madrid, Ronda de Valencia, 3, 28012 Madrid, Spain
[2] Engineering Research Institute of Aragon—I3A, Universidad de Zaragoza, María de Luna 3, 50018 Zaragoza, Spain; jyague@unizar.es
[3] Department of Civil and Mechanical Engineering, Technical University of Denmark, Produktionstorvet Building 427A, 2800 Kgs. Lyngby, Denmark; guto@dtu.dk
* Correspondence: roque.calvo@upm.es

The evolution from current to future factories is supported by research contributions in many fields of technology. While lean manufacturing techniques represent a main improvement paradigm, the integration of new processes and technologies is a breakthrough for step-change improvements and systems evolution. The dominant paradigm of Industry 4.0 is a common framework under development. Accordingly, this Special Issue presents research results focused on the latest technologies and the design/operation of manufacturing systems contributing to this evolution towards the digitalization of production as well as the factory itself. The Special Issues consists of 14 original research papers and two review papers, which cover both fundamental and key enabling digital technologies, as well as the design and application of these technologies for the digitalization of production, covering six main domains: (1) Lean Manufacturing and Industry 4.0; (2) Internet of Things in Manufacturing; (3) Virtual Reality/Augmented Reality in Manufacturing; (4) Digital Technologies for Production Planning; (5) Machine Learning in Manufacturing; (6) Digitalization in Handling and Assembly.

(1) Lean Manufacturing and Industry 4.0. Peças et al. [1] proposed a conceptual approach for the continuous improvement cycle Plan-Do-Check-Act, depicting how Industry 4.0 technological concepts should be used for its enhancement. Gil et al. [2], using a systematic literature review process, clarified the origin, evolution, and diversification of the lean concept and concluded that the use of "lean" as systemic thinking is likely to be further extended to new research fields.

(2) Internet of Things in Manufacturing. Hosseinifard et al. [3] developed a simple wireless and passive RFID system for analogic pressure manometers, showing an affordable digitalization of analogic industrial systems. Vuković et al. [4] presented a low-cost prototyping solution for the legacy machine retrofit through the Industrial Internet of Things (IoT), facilitating process monitoring through hardware digitalization.

(3) Virtual Reality (VR)/Augmented Reality (AR) in Manufacturing. Ho et al. [5] used a systematic literature review methodology to draw conclusions concerning the emerging interest in using AR as an assisting technology for the quality sector in an Industry 4.0 context and proposed a design procedure for the development of long-term AR-based solutions in the future. Kim and Jeong [6] proposed a VR/AR collaboration model that increases the efficiency of manufacturing environments simultaneously with participants through 3D rendering virtualization of facilities or robots.

(4) Digital Technologies for Production Planning. Chiacchio et al. [7] accomplished a performance analysis of a repairable production line using a hybrid dependability queuing model based on Monte Carlo simulation. Rodríguez-Padial et al. [8] presented the assisted-driven design of customized maintenance plans for industrial plants. Liu

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and Urgo [9] showed the robust scheduling framework for re-manufacturing activities of turbine blades. Moshiri et al. [10] presented an injection molding industrial case study for high-volume production in which the value chains for the production of additively and conventionally manufactured multi-cavity tool steel inserts are compared. May et al. [11] discussed the simulation of ontology-based production using the commercially available software OntologySim. Kubalíc et al. [12] solved the facility layout problem by applying alternative facility variants modeling.

(5) Machine Learning in Manufacturing. Chen et al. [13] critically discussed how machine learning is applied today in manufacturing towards Industry 4.0 at Product, Process, Machine, System levels; Mollaei et al. [14] presented an application of Machine Learning for defect prediction and process optimization in plastic injection molding.

(6) Digitalization in Handling and Assembly. Bianchi et al. [15] presented a modular under-actuated surface to perform handling tasks, such as sorting, stopping, or slowing down material flows, by exploiting the previous speed or gravity. Bencak et al. [16] proposed a simulation model based on ADAMS/MATLAB co-simulation for robotic pick-point evaluation using a two-fingered robotic gripper.

This variety of technologies, new methodologies, and novel approaches anticipate a near future with plenty of fruitful contributions to research and professional practice in sustainable and digitalized factories.

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