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53rd CIRP Conference on Manufacturing Systems

Preface

This special issue of *Procedia CIRP* contains 264 papers presented at the 53rd CIRP Conference on Manufacturing Systems (CMS 2020), held virtually from July 1-3, 2020 at Northwestern University in Chicago, USA.

The CIRP CMS is a unique and outstanding series of scientific conferences on manufacturing systems, which has been running for more than 50 years. Over the past decades, CMS has been held on most continents across the world, and is the conference series with the longest tradition among all CIRP conferences. The objective of CMS is to provide an international forum for researchers to share visions and innovations in the field, disseminate recent advances, views and perspectives, and generate a significant impact on the future of manufacturing systems. CIRP membership is not required in order to participate in this conference.

Responding to restrictions posed by the coronavirus pandemic, the CMS 2020 Organizing Committee embraced the considerable challenges and organized an event that offered the 280+ registered participants an opportunity to virtually connect with each other to disseminate their research work, seek collaborations, and engage in discussions to further advance the science base and best practices in manufacturing. With enthusiastic support by the authors, CMS 2020 provided a technological as well as social platform for an information exchange with diverse international perspectives.

The theme of CMS 2020 was “Digital Manufacturing”. The 264 papers accepted for presentation were submitted by authors from 37 countries from six continents. The papers were organized into 52 parallel sessions, organized under 12 technical tracks representative of major thrust areas in manufacturing systems-related research: Cyber-Physical Systems, Additive Manufacturing, Machine Learning, Planning, Scheduling and Maintenance, Sensing, Process Monitoring and Control, Robotic and Assembly Systems, Digital Twins and Internet of Things (IoT), Battery Manufacturing, Metal Cutting and Machine Tools, Factories and Systems, Manufacturing Processes and Design, and Manufacturing Systems.

A highlight of CMS 2020 was represented by the Plenary Speeches given by two distinguished scholars, Prof. Hoda ElMaraghy from the University of Windsor, Canada, and Prof. Wei Chen from Northwestern University, USA. Their respective presentations on the Next Generation of Manufacturing Systems, particularly at the intersection of distributed/localized and global manufacturing, and Data-Driven Computational Design of Engineered Material Systems for two distinguished cases, i.e., big data and small data scenarios, provided new insights into the future of manufacturing, as well as the latest advancement in the field of engineering design that is made available by the availability of data. Their insightful presentations attracted a large number of attendees during the course of the conference.

Continuing a long-standing tradition, CMS 2020 conferred the Best Paper Award at its Closing Ceremony. This year, the award was shared by two papers by authors from Germany, Switzerland, and the USA, respectively, based on the evaluation by the Award Selection Committee. In addition, the Conference introduced, for the first time in its history, the Best Associate Editor Award. This award recognizes the outstanding effort by an Associate Editor who rigorously and expeditiously handled the paper review process. Two recipients were selected to share the inaugural award, based on the evaluation by the co-chairs of the Editorial Committee.
CIRP CMS 2020 was supported by the Northwestern Initiative for Manufacturing Science and Innovation (NIMSI), the Northwestern-Argonne Institute of Science and Engineering (NAISE), the Northwestern Center for Engineering Sustainability and Resilience, and by DMG MORI, an international CNC machine tool manufacturer with more than 12,000 employees and 100,000 customers in 79 countries worldwide. On behalf of the conference organizers and attendees, we would like to express our sincere appreciation for their sponsorship. We would also like to thank members of the Scientific Committee and Local Organizing Committees, as well as the many volunteers who gave their time to help make this first virtual CMS conference a success. It is their dedication and contribution, together with the support from all the authors and reviewers who enthusiastically participated in this Conference, that made CMS 2020 a memorable event.

**Conference Co-Chair**  
Professor Robert X. Gao  
Case Western Reserve University, USA

**Conference Co-Chair**  
Professor Kornel Ehmann  
Northwestern University, USA

**Conference Co-Chair**  
Professor Jian Cao  
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This is a resupply of March 2023 as the template used in the publication of the original article contained errors. The content of the article has remained unaffected.