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Preface

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25th International Conference on Production Research Manufacturing Innovation:
Cyber Physical Manufacturing
August 9-14, 2019 | Chicago, Illinois (USA)

Preface

Co-Editors: Cihan H. Dagli* and Gursel A. Suer #

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We are on the path of conceptualizing and building multi-faceted systems in different levels of implementation that entail complex logic with many levels of reasoning in intricate arrangement, organized by web of connections and demonstrating self-driven adaptability which are designed for autonomy and exhibiting emergent behaviour that can be visualized. The manufacturing industry is being affected by these extensive changes as production activities and facilities are evolving into cyber manufacturing systems. Our quest continues on in our ability to handle complexities and to design and operate these systems. The challenge in Cyber Physical Manufacturing Systems design is to create an organized complexity that will allow a system to achieve its goals that are dynamically changing. Manufacturing and system engineering research and practice need to rejuvenate itself to cope with these changes with a new perspective.

At ICPR-25 in Chicago global researchers in manufacturing innovation and cyber physical systems came together from industry, government, commercial research labs and academia to advance the current boundaries of their research to a new level to cope with digital global industry. Researchers shared their theory, methods and tools that will allow engineers to manage the increasing complexity in the design and operations of physical manufacturing systems.

At ICPR-25, we celebrated the silver jubilee of the International Conference on Production Research (ICPR) conferences. The first ICPR event was held at The University of Birmingham in 1971 with Professor Norman Dudley, head of Engineering Production Department, as the conference chair to begin fulfilling the mission of the International

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Foundation of Production research - to encourage communication among researchers of production systems and processes around the world. ICPR-25 is the fourth time that the United States of America hosted an ICPR bi-annual conference. Previous events were ICPR-3 in Amherst, Massachusetts (1975), followed by ICPR-9 in Cincinnati, Ohio (1987) and ICPR-17 in Blacksburg, Virginia (2003).

The theme of ICPR-25 was manufacturing innovation through cyber physical manufacturing. It attracted 272 technical papers that were scheduled over 6 parallel sessions and represented participation of 34 countries. We would like to express our gratitude to all speakers for their invaluable contribution and informative presentations. Daily plenary and special event presentations were:

- "Smart Manufacturing: Yesterday, Today, and Tomorrow" by Dr. Albert Jones, Scientific Advisor, National Institute of Standards and Technology
- "Trends towards Engineering and Manufacturing Excellence" by Professor Oliver Riedel, Fraunhofer IAO
- "The Future of the Digital Thread by Dr. Don A. Kinard, Sr. Fellow, Production Operations and Anthomy Schiml, Production Program Sr. Manager F-35 Wing, Lockheed Martin Aeronautics
- "From Pilot to Production" by Emily Jerger, Project Engineer, MxD, the Digital Manufacturing Institute

- "Super-Fast Fulfillment" by Adrian Kumar, DHL
- "What is a Cyber-Physical System?" by Dr. Barry Smith, Distinguished Professor, The State University of New York-Buffalo
- "Seru Production: A Potential Production System for Industry 4.0" by Dr. Yong Yin, Doshisha University

This Procedia contains the refereed and edited versions of the technical papers presented as part of ICPR-25 activities held August 10 to 15, 2019, in Chicago, Illinois, U.S.A. The extended version of each paper, presented at the conference, was reviewed by two referees, revised as suggested and then edited and condensed into the format herein. The Procedia is organized into thirteen (13) parts as identified in the Table of Contents and includes a total of 230 papers. In keeping with the tradition of ICPR conferences, we believe this collection will provoke thought and germinate new ideas in digital manufacturing for the future.

Further, we wish to express our gratitude to all authors for their contributions and presentations. Without their research contribution we would not be able to create this volume.

We would also like to acknowledge members of the conference organizing committee. We could not have organized such a worldwide event without their suggestions and

support. Commitments of these individuals contributed immensely to the success of the conference.

- Plenary Speakers Chair
  - Dr. Dušan N. Šormaz, Ohio University,
- Corporate/Exhibitors Outreach Co-Chairs
  - Dr. Neil Littell and Dr. Jesus Pagan, Ohio University
- Adaptive Manufacturing track Co-Chairs
  - Drs. Ming C. Leu and Frank Liou, Missouri University of Science and Technology
  - Dr. Ibrahim Tansel, Florida International University
- Abstract/Research Paper Solicitation Co-Chairs
  - Drs. Suzanna Long and Ruwen Qin, Missouri University of Science and Technology
  - Mohsen Moghaddam, Northeastern University
- ICPR Americas Co-Chairs
  - Dr. Bidana Bopaya, University of Pittsburg,
  - Dr. Shimon Nof, Purdue University
  - Luis E. Quezada, University of Santiago Chile
- IISE Liaison
  - Dr. Elizabeth Cudney, Missouri University of Science and Technology
- INFORMS Liaison
  - Dr. Alice Smith, Auburn University
- Technical Tours Chairs
  - Dr. Zeyi Sun, Missouri University of Science and Technology

Much thanks is extended to the IFPR Board Members and the many referees for their comments and suggestions. We also extend our appreciation to the conference sponsors for bringing real life dimension, issues and engineering problems to the meeting. We would like to recognize and thank Sue Turner and her staff in Missouri S&T's Professional and Continuing Education department, for all their help and effort that enabled us to sail smoothly in the organization of this conference and the production of this volume.

Dr. Cihan H. Dagli

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