

INFORMS Journal on Data Science Call for Papers Special Issue on AI and Data Science for Smart Manufacturing

Guest Editors: Michael Biehler,^a Sungil Kim,^b Chia-Yen Lee,^c Antonio Lepore,^d Chao Wang,^e Chen Zhang^f

^a Department of Industrial and Systems Engineering, University of Wisconsin-Madison, Madison, Wisconsin;

^b Department of Industrial Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea;

^c Department of Information Management, National Taiwan University, Taipei, Taiwan;

^d Department of Industrial Engineering, University of Naples Federico II, Naples, Italy;

^e Department of Industrial and Systems Engineering, University of Iowa, Iowa City, Iowa;

^f Department of Industrial Engineering, Tsinghua University, Beijing, China.

Advances in artificial intelligence (AI), data science, sensing, automation, and scientific computing are reshaping manufacturing. Across materials and product design, process planning, production, quality assurance, and maintenance, they enable more adaptive, efficient, and sustainable decisions. However, manufacturing data are often high-dimensional, multimodal, heterogeneous, partially observed, and subject to distribution shifts and physical, safety, and operational constraints. This special issue seeks rigorous, generalizable data science methods and well-designed empirical and experimental studies that address these challenges and advance smart manufacturing. Areas of interest include the following.

1. AI-enabled materials discovery and manufacturing design. Material behavior, product design, and processing conditions jointly determine manufacturability and performance, yet exploring these relationships through physical experimentation alone is costly and slow. AI and data science can integrate scientific, experimental, and manufacturing data to accelerate materials discovery and guide product and process innovation. We encourage methodological and empirical work that establishes reliable links among these domains.

2. Learning from complex manufacturing data. Manufacturing systems generate data across sensors, machines, products, and stages of production. These data are often multimodal, functional, high-dimensional, partially observed, and collected under changing conditions, creating substantial challenges for statistical modeling and process monitoring. We encourage research that extracts generalizable knowledge reliably identifies meaningful process changes while accounting for the inherent structure, quality, and availability of manufacturing data.

3. From Predictive to Prescriptive Analytics. Accurate predictions alone do not improve manufacturing performance, and data-driven insights must support interventions under operational constraints and competing objectives. Because predictive association does not necessarily reveal how a process will respond to action, we encourage research that develops rigorous links among learning, process knowledge, and consequential decisions throughout the manufacturing lifecycle.

4. Reliable and adaptive AI in industrial environments. Manufacturing environments change across machines, products, and operating regimes, while errors can have serious economic and safety consequences. AI systems must therefore remain reliable under distribution shifts, quantify uncertainty, and adapt safely when new data are limited. We seek research that establishes when industrial AI can be trusted and how it can support accountable human and automated decisions.

We welcome interdisciplinary theoretical, computational, empirical, and experimental research. A well-suited contribution should be written from a data science angle, i.e., highlighting the new science in using data and offering insights beyond a routine application of existing data science or machine learning methods.

Submission

To be considered for the virtual special issue, submit your manuscript online via <https://mc.manuscriptcentral.com/ijds>. Select “Special Issue on AI and Data Science for Smart Manufacturing” as the manuscript type in Step 1. Each manuscript will be assigned to a guest editor.

The special issue provides a timely outlet for innovative research on these and related topics. Papers will be processed upon receipt, and accepted papers will appear in regular issues online without delay. The online collection will connect them through a unifying editorial article for greater impact and outreach.

Important Timelines

- Submission deadline: June 1st, 2027. Manuscripts will be reviewed as they are received.
- Target date for first-round decisions: Sep. 1st, 2027.
- The subsequent timeline will depend on authors’ revision time; guest editors will aim to complete each revision review within 60 days.
- Maximum of two rounds of revisions (three decisions total).