


 Journal of
 Mechanical
 Design

Guest Editorial

Joint Special Issue: Advances in Design and Manufacturing for Sustainability

This special issue presents a collaborative initiative between the ASME Manufacturing Engineering Division (MED) and the Design Engineering Division (DED) to promote research in sustainability within the design and manufacturing communities. As the need grows for methodologies and tools capable of supporting sustainable systems, this compilation presents recent research trends exploring the integration of sustainability principles into and progression toward sustainability goals by the design and implementation of engineered systems.

We were pleased to receive submissions covering a wide range of design and manufacturing topics. The quality of the submissions and the enthusiastic participation of the community were notable. Following a rigorous peer-review process, 11 submissions were ultimately selected for publication. The papers are published within special sections of the *Journal of Mechanical Design* (JMD) and the *Journal of Manufacturing Science and Engineering* (JMSE).

The chosen submissions for the special issue cover research within diverse sustainability-related topics categorized into six main groups: (1) design for remanufacturing, (2) advancements in sustainability assessment, (3) design interventions for user-sustainable behavior, (4) advancing disassembly practices, (5) techno-economic analysis of energy systems, and (6) innovative tools for teaching sustainability, as detailed below.

Design for Remanufacturing: This category features two papers. The paper by Behtash and colleagues introduces a comprehensive framework, "Reman Co-Design," merging design and remanufacturing optimization for enhanced sustainability performance. The paper by Alves and co-workers addresses textile waste by proposing 12 design for sustainability and flexibility principles. The work showcases the development and testing of a mechanical textile recycling system for efficient material recovery.

Advancements in Sustainability Assessment: This category explores innovative technologies for sustainability assessment, covering three papers. The paper by Mabey and co-workers introduces an approach for predicting social, environmental, and economic impacts of products through agent-based modeling and life cycle assessment. The work of Karkaria and colleagues proposes a machine learning-based framework for predicting tire life in the commercial freight industry by focusing on product usage data. The paper by Liao and co-workers investigates the capabilities of AI algorithms for the automated evaluation and rating of product reparability.

Interventions for Sustainable Behavior: This category explores interventions designed to drive behavioral change toward

improving sustainability performance. The paper by Halabieh and Shu explores the effect of limiting wastewater outflows in reducing water consumption and influencing water-conserving behavior. The paper by Rea and colleagues investigates the relationship between thermostat interaction and temperature selection in warm ambient conditions and shows how innovative intervention offers insights into designing products that foster energy-conscious behaviors.

Advancing Disassembly Practices: This category investigates disassembly strategies critical for sustainable product life cycles. The paper by Rodríguez and Favi proposes an eco-design methodology for mechatronic products, focusing on reparability and circular economy principles. The paper by Lee and colleagues explores the prospects and challenges of introducing human-robot collaboration in product disassembly. Recognizing the inefficiency of manual disassembly, the study reviews recent progress in robotic disassembly, emphasizing the potential benefits of combining human skills with robotic precision.

In addition to the aforementioned topics, the remaining two papers address techno-economic analysis and sustainability education. The paper by Li and Zhang examines the techno-economic dynamics of co-located wind and hydrogen energy systems within an integrated energy system. The paper by Raoufi and Haapala shifts focus to teaching sustainability concepts to non-experts using an analysis tool designed to facilitate sustainability performance analysis of manufacturing processes and systems.

We hope these special sections of JMD and JMSE lay the foundations for ongoing and future research in sustainable design and manufacturing. Furthermore, we hope this compilation of papers has established a pathway for disseminating the attendant research findings to future visionary leaders across an array of disciplines to advance the application of sustainable systems engineering research within our society and industry.

Special gratitude goes to Dr. Carolyn Seepersad, Editor-in-Chief of JMD; Dr. Albert Shih, Editor-in-Chief of JMSE; and Dr. Wei Chen, former Editor-in-Chief of JMD, for their invaluable support, leadership, and endorsement of the idea behind this joint special issue on Advances in Design and Manufacturing for Sustainability. We also extend our sincere appreciation to Amy E. Suski and Emily Bosco, editorial assistants of JMD and JMSE, for their significant support and efficient collaboration throughout the paper review and production process.

We also express our gratitude to all contributors who responded to the call and enriched the joint special issue with their insightful submissions. A special acknowledgment goes to the reviewers for

their generous time and insightful evaluations. In addition, our thanks extend to the technical committees of ASME DED and ASME MED for disseminating information about the special issue within their respective communities.

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