INVITED SESSION SUMMARY

Title of Session:

Intelligent Manufacturing and Sustainable Process Modelling and Optimization

Name, Title and Affiliation of Chair:

Ahmed Elkaseer, Professor
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Details of Session (including aim and scope):

The transition toward sustainable design and manufacturing requires manufacturing systems that are not only intelligent and efficient, but also capable of integrating sustainability considerations across the entire product and manufacturing lifecycle. Advances in intelligent manufacturing, digitalisation, and data-driven methods provide powerful tools for modelling, simulating, and optimising manufacturing processes; however, their full potential can only be realised when sustainability objectives are embedded at the design and decision-making levels.

This special session focuses on intelligent manufacturing approaches for sustainable process modelling and optimization, addressing the strong interconnection between sustainable design, process modelling, simulation, and optimisation. The session aims to highlight state-of-the-art research and industrial applications that integrate physics-based and data-driven models, digital twins, and AI-enabled optimisation techniques to improve resource efficiency, reduce environmental impact, and enhance process robustness and product performance.

Emphasis is placed on methodologies and tools that support lifecycle-aware decision-making, linking product design, material selection, manufacturing processes, and post-processing within a unified sustainable framework. Contributions covering both theoretical developments and application-oriented case studies are encouraged, particularly those demonstrating measurable sustainability benefits in real manufacturing environments.

Topics of Interest (include, but are not limited to):

- Intelligent manufacturing systems and smart production environments
- Sustainable process modelling and simulation techniques
- Digital twins for manufacturing processes and systems
- Modelling and optimisation of advanced manufacturing processes
- Additive manufacturing process modelling and sustainable optimisation
- AI-driven and data-driven process optimisation methods
- Sustainable design-manufacturing integration
- Energy- and resource-efficient manufacturing systems
- Sustainable post-processing and hybrid manufacturing workflows
- Material modelling and material tailoring for sustainable applications
- Lifecycle assessment (LCA) and lifecycle-driven process optimisation
- Design for sustainability and circular manufacturing systems
- Multi-objective optimisation and decision-support tools for manufacturing
- Application-oriented manufacturing processes and industrial case studies

Authors' guidelines, important dates, and submission instructions can be found on the conference website:
http://sdm-26.kesinternational.org/

Main Contributing Researchers / Research Centres (tentative, if known at this stage):

▪ The British University in Egypt (BUE)
▪ Farouk El-Baz Sustainability Research Centre of Excellence (SRC), BUE

Website URL of Call for Papers (if any):

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