

Invited Session Proposal – MIM 2025

Transforming Warehousing operations: The Role of Automation and the Impacts of Innovative Simulation Approaches and Digital Twins

Keywords: automation, automated warehouse, simulation, innovative technologies, digital twins

Short Presentation

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In the light of the growing complexity of global supply chains, exacerbated by recent global disruptions, the pressure on intralogistics processes has dramatically increased. The term intralogistics is used to describe the management, control and optimisation of material and information flows within a facility. This encompasses the entire journey of a product from a logistics perspective, from the receipt of raw materials to the distribution of finished products. Therefore, this complex network of internal logistics processes includes a wide range of critical activities, including storage, material handling, internal distribution, and transportation. As global supply chains face increasing demand for efficiency, agility, and sustainability, organisations are now tasked with managing demand fluctuations, supply chain bottlenecks, and rising consumer expectations, all while maintaining operational efficiency and cost-effectiveness. In response to these challenges, the role of cutting-edge solutions are reshaping the industry and driving the next wave of efficiency in internal logistics processes. These solutions may include automation, optimization of internal processes, and the integration of emerging technologies.

Automation is at the forefront of the intralogistics revolution, from automated mobile robots and robotic picking systems to automated storage and retrieval systems. This theme focuses on the impact of full and partial automation on productivity and cost savings, as well as challenges in implementing large-scale automation, such as integration, scalability, and workforce adaptation. Internal logistics processes such as material handling, inventory management, and order fulfilment are critical to operational efficiency. Relevant topics include leveraging real-time data and analytics for process optimization, strategies for enhancing flexibility and responsiveness in intralogistics operations. Technologies like artificial intelligence, Internet of Things, blockchain, and digital twins are unlocking new opportunities in intralogistics. This topic will explore the potential of IoT sensors and real-time tracking for visibility and asset management, artificial intelligence and machine learning in decision-making processes, the use of digital twins for simulating and optimizing warehouse layouts, workflows, and equipment performance.

Therefore, the objective of this session is to provide a platform for investigating the latest developments at the intersection of intralogistics, automation, and emerging technologies. The focus will be on the evolution of automated systems, and their transformative impact on internal logistics processes. The session will also address the

broader implications of integrating these systems with cutting-edge technologies like artificial intelligence, machine learning, Internet of Things, and digital twins, and how these innovations can drive the next phase of supply chain optimization. Through this session, the aim is to foster a dialogue on the future trends of intralogistics, highlighting how advances in automation and emerging technologies are redefining the boundaries of internal logistics, and how organizations can leverage these innovations to achieve greater operational excellence and meet the demands of the future.

In this session, the aim is to share insights and innovative approaches, discuss challenges, and present real-world case studies of successful intralogistics advances.

Thus, by highlighting these themes, we invite submissions on topics including but not limited to:

- Automation technologies and robotics in warehouse operations.
- Case studies of digitalization in warehouse and distribution centre management.
- Artificial Intelligence and Machine Learning applications in internal logistics processes.
- Simulation and Digital twin in warehouse operations.
- Strategies for overcoming challenges in the adoption of automation and innovative technologies.
- Required competences and skills for warehouse automation

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