15th IFAC Workshop

Intelligent Manufacturing Systems (IMS 2025)

Koszalin, Poland, 11-12 September 2025

https://ims2025.pl/

This proposal is endorsed by TC 5.1

Invited Session Proposal:

Artificial intelligence for automated process planning in advanced manufacturing systems

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Keywords: Process planning, Scheduling, Optimization, Artificial intelligence, Flexible and reconfigurable manufacturing systems, Smart factories, Cloud manufacturing, Cyber-Physical Systems

Code: ku9i7

ABSTRACT
This invited session deals with the use of Artificial Intelligence (AI) to automate process planning for the manufacture of complex and customized products, using advanced manufacturing systems in industries such as automotive, medical and electronics. Traditionally, (computer-aided) process planning has relied on the knowledge of domain experts to devise a suitable sequence of manufacturing processes or tasks to translate a product design into a physical component. However, human errors can lead to inaccurate or even infeasible plans and different engineers can come up with inconsistent solutions. AI can be utilized to automate process planning, minimizing manual efforts and preventing errors and inconsistencies. Available facilities can also be used more efficiently and economically, enabling the reuse of existing resources, in particular through adaptations and reconfigurations of machines and production lines. This includes virtual resources in cloud manufacturing environments.

The aim is to investigate how AI can minimize the reliance on domain experts and be effectively utilized for generating optimal manufacturing process plans and schedules. Apart from reducing planning and manufacturing costs, this area of research contributes to reducing lead time, especially for customized products requiring a large number of process plan variants. This session offers the opportunity to reflect on practical applications of AI in process planning, present success stories and share best practice, as well as giving an insight into future research directions.

This session invites papers using any AI approach (e.g. symbolic, machine learning, evolutionary). Industrial case studies are especially welcome. The topics of interest include, but are not limited to:
- Automated planning and scheduling
- Formal models for design, analysis and verification
- Combinatorial optimization
- Multi-objective optimization
- Constraint satisfaction
- Data-driven methods
- Digital twins
- Process reliability
- Knowledge-based systems
- Decision-support systems
- Intelligent agents
- Autonomous robots
- Flexible and reconfigurable manufacturing systems
- Cloud manufacturing
- Cyber physical production systems
- Industrial IoT

Timeline:

- **December 16, 2024:** Deadline for paper submission
- **March 03, 2025:** Notification of acceptance/rejection
- **April 07, 2025:** Final paper submission
- **September 11-12, 2025:** 15th IFAC IMS Workshop (IMS 2025), Koszalin, Poland

Manuscript Preparation

For Manuscript Preparation please look at http://www.ifac.papercept.net/conferences/support/support.php
For Manuscript submission please look at https://ifac.papercept.net/conferences/scripts/start.pl
Upon submission, make sure to use the **Invited session identification code: ku9i7**

For any further information, please contact the Special Session Technical Committee

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