



The 22nd World Congress of the International  
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## **Sustainable Manufacturing: Energy management stakes in a digitized world**

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### **Short presentation:**

Manufacturing companies are known by their relevant resource and energy consumption and negative impact on the environment. Reducing emissions, waste and energy consumption are one of the main objectives of many industries. This session addresses sustainability as a huge challenge in manufacturing and highlights in particular energy management stakes.

The vision of the fourth industrial revolution is not only to optimize production and minimize costs but also to control the consumption and cost of energy in manufacturing with the new opportunities opened by digital technologies, artificial intelligence (AI), and the use of data analytics.

A significant change in Industry 4.0 compared to the old traditional industries is the fusion of the physical and the virtual worlds, which is made possible by Cyber Physical Systems (CPSs) and Internet of Things technologies (IoT). Indeed, typical resources (machines, operators...) are converted into intelligent objects and smart humans so that they become able to sense, act, and interact within a smart connected environment.

Exploiting their communication capabilities allows to obtain a collaboration mechanism achieving an energy-efficient control system. Meanwhile, the production system shall be stable and robust towards all kinds of disruptions, whether internal like machine failures or random jobs arrival, or external such as dynamic variation in energy availability, different prices of energy sources, etc.

This session aims at bringing together reflections and innovative ideas on methodologies and solutions to manage energy consumption and to get energy-efficient manufacturing systems through the use of advanced industrial engineering approaches and technologies, such as innovative Multi-Agent Systems (MAS) architectures, AI techniques, digital twins, to name a few. It is important to consider energy management and efficiency from the design stage of intelligent control tools, to the design of tools to sense in real time the energy consumption of manufacturing activities and to the analysis of operational data to predict the future consumption.

Main research lines, but not limited to, in this session are:

- Collaboration between energy producers and energy consumers
- Architecture of Cyber Physical Energy System (CPES)
- Multi agent architecture to control energy consumption



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- Scheduling and rescheduling methods with energy constraints
- Machine learning techniques to analyse and predict energy consumption
- Digital twin for energy consumption management
- Digital twin for sustainable manufacturing
- Collaboration between cyber-physical production systems and cyber-physical energy systems.

**Keywords:** energy efficiency, sustainable manufacturing, cyber-physical energy system, artificial intelligence, multi-agent system, energy consumption prediction

**Important dates:**

- Full paper submission: 11 November 2022
- Notification of acceptance: 21 February 2023.
- Final, camera-ready paper submission: 31 March 2023
- Conference days: 09-14 July 2023, Yokohama, Japan.