PHMAP23 Organised session Proposal form

Session organiser (Affiliation):

Foivos Psarommatis, SIRIUS, University of Oslo

Session title: **Technologies and methods for achieving Zero Defect Manufacturing in the era of Industry 4.0 / 5.0**

Theme and objective:

Zero-defect manufacturing (ZDM) is gaining a vast amount of attention and interest from both research communities and industry, and is considered by both researchers and the industry as a viable replacement for the traditional QI methods such as Lean Production and Six Sigma. This is because ZDM utilizes all the different disruptive Industry 4.0 digital technologies, which can provide almost infinite capabilities. The advancements in Industry 4.0 technologies made the achievement of Zero-defect manufacturing possible. ZDM is not one method but rather a toolbox for decreasing and mitigating failures within manufacturing processes and "to do things right the first time". ZDM covers both product and process quality. This concept had only partially been implemented so far due to many technological and economic limitations that restricted its rollout. For instance, the equipment required for data recording used to be very expensive and companies did not invest in it.

However, the landscape has changed. Industry 4.0 technologies allow the efficient implementation of ZDM and allowing achieving higher levels of sustainability. More specifically, , the evolution of Industry 4.0 digital and automation technologies, such as intelligent machines, IIoT, digital and cognitive twins, AI, etc. has allowed responses to unexpected events and disruptions to become smarter and faster. On top of that human centricity and the human AI collaboration are of crucial importance for achieving high efficiency and productivity. Finally, the availability of the large volumes of data needed for the development of machine learning-based quality control strategies has allowed "industrialized" AI to work properly within factories and across global value chains.

This special session addresses following topics in factories of Industry 4.0/5.0. Topics of interest include, but are not limited to, the following:

- Advanced defects detection systems
- Virtual metrology applications
- Rework of defected products
- Predictive maintenance
- Defects Prediction
- Human centric manufacturing
- Knowledge-based systems for ZDM
- Decision support systems for ZDM implementation
- ZDM Standards and interoperability
- Methodologies for defect prevention
- Scheduling for ZDM
- Industrial implementation case studies
- Engineering modelling and simulation
- Artificial intelligence (incl. machine learning, deep learning, collaborative learning) for ZDM
- ZDM technologies

- Product life cycle
- Data-driven Manufacturing
- Intelligent Maintenance Systems
- Digital Twins
- Cognitive Digital Twins
- Solutions and standards for the digital transformation
- Manufacturing systems for Industry 4.0

Field:

Quality assurance, Quality control, Sustainability

Tentative list of presenters (4 presenters per block):

Daryl Powel

Maria Chiara

Victor Azamfrei

Kiritsis Dimitris