

INVITED SESSION SUMMARY**Title of Session:**

Sustainability of 3D Printing and Additive Manufacturing

Name, Title and Affiliation of Chair:

Prof. Paolo Minetola, Politecnico di Torino and AITeM, Italy (Chair)
Dr. Paolo Claudio Priarone, Politecnico di Torino and AITeM, Italy (Co-chair)
Dr. Michael Ryan, Cardiff University, UK, (Co-chair)
Dr. Diego Manfredi, Center for Sustainable Futures - IIT; Italy (Co-Chair)

Details of Session (including aim and scope):

Nowadays additive manufacturing (AM) and 3D printing (3DP) technologies enable the fabrication of end-useable parts with complex shapes without the need of manufacturing tools and fixtures. Because of their intrinsic nature, layer-by-layer manufacturing maximizes the material exploitation by using the optimal amount for product fabrication, with less production scraps if compared to conventional processes.

Moreover, the possibility to enhance the product's functionality and strength by means of topology optimization pushes the reduction of part weight and raw material consumption further. Functionality improves product performance, that often results in lower energy consumption and longer product life. Beyond these capabilities, AM is ideal for make-to-order manufacturing, allowing production of spare parts for replacement and lower costs for mass customisation. AM supply chains are shorter and more localised, thus reducing the need for transportation and deliveries with smaller environmental impact in terms of CO₂ emissions.

Nevertheless, the promotion of new AM business models and a change in consumers' behaviour is necessary for the diffusion of AM technologies. To this aim, proper policies might be proposed and education of AM at different levels will improve people awareness towards cleaner and more sustainable manufacturing.

The scope of the proposed session will be to deal with the sustainability of 3DP and AM technologies along the whole product lifecycle. The topics of the session will cover the following:

- Design for AM and topology optimization
- Assessment of optimal exploitation of material and resources in AM
- Recycling of materials in AM and 3DP
- Assessment of the environmental impact of AM processes
- Sustainability of AM product lifecycle
- Energy efficiency of AM
- Comparison and integration between AM and conventional manufacturing
- Analysis of AM value chains
- Policies to promote new AM business models
- Social impact of 3DP and AM education

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

Tentative list could be:

Prof. Paolo Minetola, Politecnico di Torino, Italy
Dr. Paolo Claudio Priarone, Politecnico di Torino, Italy
Dr. Daniel Evers, Cardiff University, UK
Dr. Diego Manfredi, Center for Sustainable Futures - IIT, Italy
Members of Additive Manufacturing group of AITeM (Italian Association of Manufacturing Technology)

Other contributions are welcome.

Website URL of Call for Papers (if any):

<http://sdm-17.kesinternational.org/submission.php>

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