

Simulation in the design of AM devices

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In recent years, Additive manufacturing is changing production methods, creating new market niches and transforming the design methodologies of parts and their assembly.

In order to take advantage of all the opportunities offered by the wide range of additive production techniques, one needs to direct the scientific research towards the study of simulation in the processes involved in production and the topological optimisation of the components realized through this technology.

In this new technological context, the device used to implement the technology and the control structure used to ensure the precise movement thereof should not be neglected. As is well known, in the majority of cases 3D printers were derived by adapting mechanical designs, drives and controls previously developed for generic machine tools.

In order to improve the quality and the rapidity of the production an in depth analysis of the entire system is required. Simulation can be also used to take into account all these aspects with particular focus on mechatronic design.

In this special section the topics relating to design procedure, simulation of the entire production machine, as well as the evaluation of the effects in changing the control algorithms and more generally the so called digital twin creation of the production system are discussed.

The authors are invited to submit their contributions on the following topics:

- Simulation guided design of an additive manufacturing device
- A priori analysis of repeatability and accuracy
- Digital twin technologies for AM
- Mechatronically based approaches for AM