## ADDITIVE MANUFACTURING IN CONSTRUCTION

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## ABSTRACT

Buildings have always been uniquely designed structures that have to adopt to their particular environment thus requiring a labour-intensive construction process. Additive manufacturing has the potential to revolutionize civil engineering by reducing the reliance on human labour and by offering new freedoms that facilitate individualized optimizations in both function and efficient use of material [1][2]. However, additive manufacturing relies on a digital design and the predictability of the underlying processes. In this regard, additive manufacturing in civil engineering poses several specific challenges such as comparably poor control on environmental variables at the construction side (e.g. weather), the combination of different building materials and the comparably large uncertainties in material properties and homogeneity of typical building materials (e.g. concrete). Due to the typical size of civil engineering structures, material and energy efficiency of the construction process are also of paramount importance.

This session will focus on the modelling and simulation of additive manufacturing in civil engineering. The scope of this session covers innovative simulation techniques as well as applications of such techniques in additive manufacturing in construction. Topics include the modelling of building materials such as concrete, wood, metal and clay, on-site and off-site construction processes such as spraying, extrusion, selective laser melting, wire arc additive manufacturing, particle activation, particle bed infiltration and other innovative construction techniques suitable for civil engineering. Contributions based on reduced order models or data driven auxiliary models for in-situ process control and path planning, as well as the application of simulation in process and product optimization are also within the scope of this session.

- [1] Kloft, Harald, et al. *TRR 277: Additive manufacturing in Construction*, Civil Engineering Design 3.4 (2021): 113-122.
- [2] Jamali, Koosha, Vinayak Kaushal, and Mohammad Najafi. *Evolution of additive manufacturing in civil infrastructure systems: A ten-year review*, Infrastructures 6.8 (2021): 108.