Challenges of 3d printed architectural ceramic components structures: controlling the shrinkage and preventing the cracking

Bruno FIGUEIREDO*, Paulo J. S. CRUZ, João CARVALHO, João MOREIRA

*Lab2PT, School of Architecture, University of Minho
4800-058 Guimarães, Portugal
bfigueiredo@arquitetura.uminho.pt

Abstract
The use of ceramic materials in the additive manufacturing (AM) of architectural components has more and more examples and undeniably shows the potential of its application. However, one of the main characteristics inherent to this material, which happens in drying and firing phases, is the shrinkage of the material, which causes deformations and cracks in the surface of the produced elements. Thus, the shrinkage of the ceramic material may constitute an obstacle to the regular use of this material in the AM of architectural components. In this sense, it is important to study and point out ways and strategies to mitigate this drawback, making possible the correspondence between the final produced models and the digital ones in which they are based. This paper presents the main challenges and outcomes of several projects that use Liquid Deposition Modelling (LDM) of clay-paste as construction methodology.

Keywords: Ceramic 3D printing, additive manufacturing, ceramic retraction, parametric design, computational models, shrinkage, ceramic paste, Liquid Deposition Modelling.

References