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Reflections on a collaborative research project in digital moulding for glass casting and artistic interpretations

This is a two part paper; firstly describing a collaborative research project aiming to provide innovation in glass investment casting through the exploration of digital fabrication methods. Secondly, illustrating examples of the artistic exploration of this process alongside digital technologies, such as 3D scanning, in the pursuit of mixed media artefacts. It will therefore compare traditional moulding and construction methods with digital fabrication methods. The paper is written from my perspective as a glass artist with little experience of digital technologies and discusses the impact of the collaboration upon my working methodology and creative output.
This research project was initiated in early 2010 at Falmouth University by Tavs Jorgensen, Research Fellow in 3D Digital Production and myself, Gayle Matthias, Senior Lecturer in BA(Hons) Contemporary Crafts, both members of Autonomatic, a research group at Falmouth University.The aim of the project is to explore ways of combining my specialist knowledge of kiln-formed glass and Jorgensen's experience with digital design and fabrication technologies.

Previously I collaborated with Aron McCartney, providing a case study for his PhD research into ceramic shell moulding, which had not previously been explored in terms of glass casting. Whilst this technique had numerous significant advantages compared with conventional glass moulding techniques, this method presented a number of technical challenges for users and has so far seen limited adoption by the glass community. The impetus behind our research project was to utilize my knowledge of the ceramic shell process by extending its application and relevance when combined with emerging digital fabrication technologies.

This research has now successfully established an entirely new method of creating glass casting moulds directly from three-dimensional CAD files without the need for a physical pattern. The method developed is based on Additive Layer Manufacturing (ALM) technology using a three-dimensional printer, a process commonly known as 'Rapid Tooling' (RT). The inner part of the mould can be printed on a 3D printer and strengthened by the application of refractory outer layers. Through examples of my creative practice, which employs both conventional and digital methods of mould production, the paper will illustrate a number of unique advantages of RT digital moulding including: accurate glass casting, economies in mould production and firing schedules which could have an impact on studio and institutional glass casting production methods.

The success of the project has resulted in sponsorship from the sector leading companies ZCorporation (US) and Gaffer Glass (NZ).

The paper will also reflect on the personal struggles of finding an artistic application/voice for digital tooling, especially with a restrictive digital skillset to draw on. Issues concerning autonomy of production, aesthetic values and relevance to established artistic concepts and material language are discussed. My current artistic practice concerns low-tech construction methods to assist with the exploration of concept over and above the technical process, and so the paper will also address the dilemma of how to use digital tools to help realize and stay true to the original ethos of making.