3D Printing of Ceramics for Design Concept Modelling

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Early 3D printed examples
Early 3D ceramic printing
3D printed ceramic
3D printed ceramic
Where next?
3DP ceramic concept models

Many ceramic tableware companies now use 3D CAD to design new products and CNC machining to produce original mould tooling.

Some ceramic tableware companies use 3D printers to realise a concept model in physical form.

This has many advantages in speeding up the design process and allows many iterations of the design idea to be assessed quickly and modified to suit the customers needs.
Where next?
3DP ceramic concept models

What the customer wants to see is the concept model in the actual material of the finished product glazed and decorated.

Using conventional methods this is a slow and very expensive process.

By using the 3DP ceramic process it is possible to directly translate a 3D CAD model into a ceramic artefact that can be fired glazed and decorated if required.
Where next?
3DP ceramic concept models

Approached Denby Pottery to act as industrial partner on the project and to provide technical support and design expertise

Approached the UK Arts and Humanities Research Council to provide follow on funding to research and develop the idea

 Granted funding for a 12 month project which commenced in April 2011
Denby Pottery
Denby 3D printing
Shapes for initial trials
3D printing models
Firing models
Problems
Conventional ceramic tableware forming versus 3DP ceramic forming

Conventional forming:
Clay based system, mechanical pressure forces the constituent particles together in a water based suspension or paste

Firing:
During the firing the clay gradually changes from a plastic material that binds together the body matrix to a component that reacts with the fluxes and other ingredients to form a glass like material that holds the matrix together

3DP ceramic forming:
Uses an ink-jetted binder to act on a dry material mix containing ceramic powders and organic binders, essentially “glueing” together the particles

Firing:
In a 3D printed ceramic the organic binders can burn away during the firing before the ceramic components can start to sinter and hold the structure together, this can be problematic with thin sections and can cause the object to collapse under it’s own weight
Potential solution: 3DP support structure
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Cups with support structures
Plate with support structure
Successful fired examples
Successful fired examples
Denby concept sugar bowl
Production sugar bowl & Z Corp model
3DP ceramic sugar bowl unfired & fired
3DP ceramic concept models
Future developments

In collaboration with Denby pottery we will work with designers to produce a range of new concept models for the process

Hold an exhibition of work from the project

Continue technical development of 3DP ceramic bodies and firing to increase both green and fired strength and density

We have reached an agreement to license the current UWE/CFPR 3DP ceramic material to Viridis 3D LLC in the USA for commercial production