

## IMPACT 8 Journeys across Disciplines, Dialogues in Print. – Dundee, Scotland 2013

Illustrated Paper

Panel: Crossing Disciplines  
Session 23 Room 3G05

**Title:** Print and Refractory Concrete: new opportunities in scale, surface and durability.

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The aim of this interdisciplinary investigation was to explore the potential of printmaking techniques in the production of large innovative intaglio prints made in refractory concrete.

The project represents one area of research within the wider on-going research projects taking place at UCLAN in both print and silicates research. As the title of this conference suggests it is a true 'journey across disciplines'.

For a number of years, Hill has been developing a way of translating the marks from etched metal plates and silkscreen images onto the surface of cast plaster. The direct interaction with the plaster surface and the relationship which resulted between the transferred ink of the etched plate and the layer of ink laid down by the silk screen offered many potential combinations creating a versatile and unique medium that was printed, yet was capable of a relief surface.



### *1. Tracy Hill Plaster Prints*

Unfortunately the disadvantage of this process was the fragility of the resulting works when transported and used in exhibition situations. A potential solution was to translate the process into ceramic to create pieces capable of being shown as floor installations and or in public spaces.

A potential solution was presented by Bremner's experimental research at UCLan using refractory concrete to create large format architectural ceramics and we hoped that this would present a way to achieve pieces that would have the scale and durability that was required for future installation projects. It was thought that this way of working would also offer avenues to explore depth of surface and print qualities in Refractory concrete that hadn't been explored within Bremner's previous work.

Refractory concretes are high temperature concretes that behave in much the same way as conventional cement and can be cast into large durable shapes, however crucially they can be glazed and therefore are able to make use of a wide range of ceramic surfaces. Refractory concretes have been used extensively in high temperature industrial applications for over 60 years and are commonly used in the steel, glass and chemical industries where large scale Monolithic products are cast to very high specifications, they are designed specifically to deal with very harsh environments at very high temperatures. However their unique properties have rarely been employed beyond their intended industrial sphere and their use in design and certainly in fine art printing is very limited.

At UCLan, academics and students have been exploring the use of RC for a number of years for mainly for applications in architectural features and design and sculpture applications where we seek to make use of the various unique properties and advantages Refractory concretes can offer over conventional clay. Which include:

- RCs will typically shrink less than 0.5% compared with up to 12% for some clays. This means they will not suffer from warping due to uneven drying and firing.
- Clay is brittle and easily damaged at a dry or green state making handling difficult, particularly on a large scale.
- Ceramic is inherently weak in tension, RCs are substantially stronger in tension and can be used for wide spans, impossible with conventional ceramics.
- They can be decorated using ceramic oxides and glazes

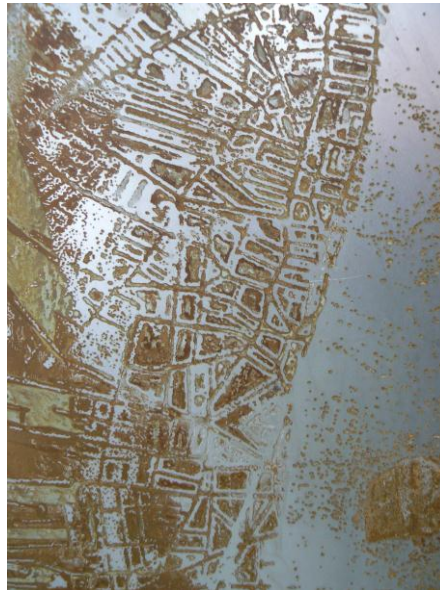
We were confident that the properties of Refractory concrete would enable us to produce the scale of pieces that Hill was after and would make durable and lasting pieces. The concrete, when fired to over 1200°C changes the chemical bonds holding the concrete together to ceramic bonds. These bonds and the coloured, glazed surface can be expected to last for thousands of years, surviving, fires, floods and direct sunlight without degradation of the surface or colours.

So, while I was sure the material and the process previously developed could deliver on durability the new research was in establishing if we could replicate or deliver the surface qualities and print effects desired using ceramic glazes and oxides.

Working with ceramics is not as immediate as print or the plaster casting technique Hill had developed, when the plate is created and the concrete has been cast you are only half way there, multiple firings are needed that can take a day at a time. Metal oxides used as pigments interact during firing with the glazes, changing black powders into green and blue glass surfaces, that behave very differently than inks. Compromises were inevitable, however, as so often happens in ceramics and as in printmaking those compromises and happy accidents led to the creation of new ideas and new directions.

Initially the idea was perceived as a yearlong project its aims were to explore the practical, technical and aesthetic considerations necessary for the combination of the worlds of contemporary print and the silicate research unit. The collaboration would produce a series of printed concrete panels which were to be shown as part of the Liverpool Biennial Independents 2012 and later at 'Impressit' at The Harris Museum and Art Gallery in Preston 2013.

Both printmaking and ceramics are diverse, founded on tradition and employing techniques and methods which are hundreds of years old, even thousands in the case of ceramics. However, both thrive on new technologies and the change and innovation that these can bring.



## *2. Etched steel plate*

For the initial testing we adapted traditional techniques and processes, developing a way of working which aimed to facilitate experimental use of fine print and contemporary ceramics. The tests were very positive and provided enormous scope for the development of both mediums through further experimentation and exploration.

We started by casting the concrete from large etched steel plates which had been inked using a mixture of oxides and copper plate oil was an enormous challenge both physically and technically. It was decided that batches of 3 plates at a time would be cast and fired.

Bremner's expertise and knowledge of ceramics and glazes guided and informed the casting and firing of the pieces. However neither of us had any true reference points for how the final pieces would look, needing to draw instead on instinct and tacit knowledge built up in each of our subjects. In order for this collaboration to succeed there had to be a willingness to go beyond our own personal knowledge and a willingness to pursue something innovative and challenging. Also there had to be an acceptance that the pieces may not work.

Timing and space were our major consideration when casting was to take place. Moulds were constructed and prepared and laid out before plates were inked and carried through to the studio where the concrete was to be mixed. The concrete was mixed using commercial mixers and then carried and poured into the moulds containing the etched and inked plates.



*3. Casting onto print plates*

This had to be done swiftly as once the concrete begins to set there is little time for manipulation in the moulds. The concrete had to be pressed down into the moulds and air bubbles had to be encouraged to the surface before the concrete set too firmly.

After casting the first set of plates it became apparent that in the areas where the concrete had begun to set before it had been pushed down onto the plate its ability to transfer the mixture of oxide and copper plate oil from the etching plate diminished significantly leaving at times only the cast relief surface. Also the first estimates of the quantity needed to fill the moulds were not correct which caused a difference in thickness between panels.

One of the main qualities we wanted to replicate from the earlier plaster pieces were the unique marks created by the intaglio surface which were unfortunately being partly lost in this casting process.

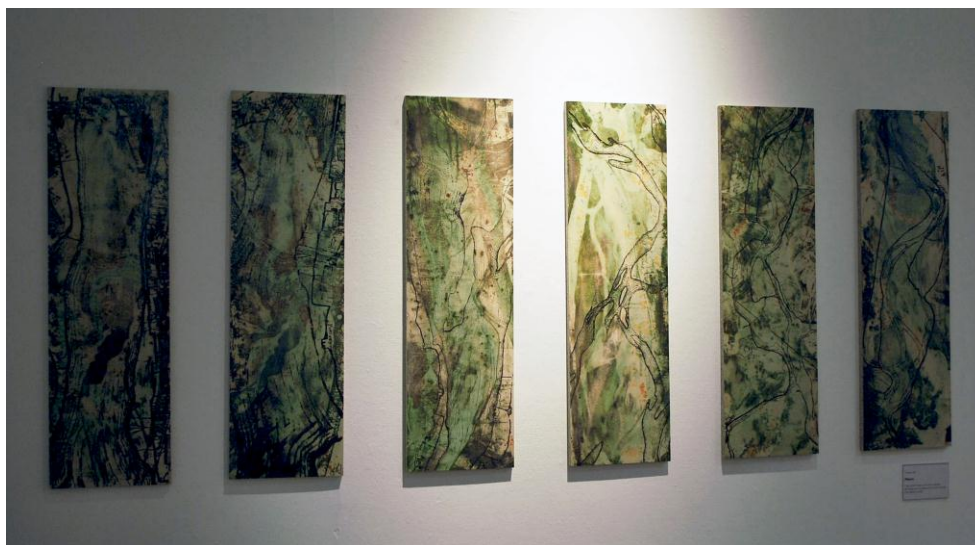


*4. Cast fired prior to glazing*

We had not appreciated when beginning this project how different it would be working with refractory concrete compared to plaster. The immediacy of inking and printing from metal plates is something that artists working with print rely on. We learn to read the surface of the plate when etching and respond to that surface when printing accordingly to how the ink lies. The process of casting and firing with the refractory concrete was a huge challenge. The oxide ink moved very differently to traditional ink, it was hard to wipe and see on the steel surface. It was necessary to ignore the visual appearance of both the oxides and the cast refractory concrete before firing as both required the heat of the kiln to interact and produce their true forms and colours. Without the experience of working with these materials it made it impossible to predict the outcome of how layers would work together.

The very properties that were attractive with the process also meant that any alterations needed to be made to the panels were time consuming and needed to be considered carefully as the time between making and inking the plate, casting, glazing and then re-firing takes days.

However without any expectations or preconceived ideas about the final works, Hill found a freedom to truly experiment with this process and to respond to the materials in a way that would not have been possible if working in a more traditional way.



*5. Maere Installed in the Harris Museum, Preston 2013*