

Art and science in glass and ceramics: Case studies from the post-graduate art and design sector

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*A text and image version of a presentation given at the 'Atoms to Art' Networking event
13-14 September 2005
Manchester Art Gallery*

Overview

As the purpose of *Atoms to Art* was to network and share activities relating to science and art in glass and ceramics, this paper will give a brief introduction to some relevant projects that I have been connected with over the last ten years. There are four main sections:

- An introduction to Glass and Ceramics at The University Sunderland
- An overview of my background and current role at Sunderland
- An outline of my PhD - An example of art and science collaboration.
- An introduction to relevant post-graduate research at Sunderland

An introduction to Glass and Ceramics at The University of Sunderland

The Glass and Ceramics department at the University of Sunderland is based in the National Glass Centre. We have been teaching glass and ceramics for around 28 years and in the last three years have seen a substantial development in our facilities with over £1 million of external funding. This has enabled the installation of a broad range of equipment including; a water-jet cutter, a large kiln for glass, and print making equipment.

We divide our curriculum into four broad areas: Kiln Glass, Hot Glass, Architectural Glass, and Ceramics.



Kiln Glass: MA Glass student Hannah Kippax winner of the 2004 Glass Biennale



Hot Glass: Works by Sunderland MA Glass Graduate and Hot Glass technician James Maskrey



Architectural Glass: Stained glass panels by Julia Davies - MA Glass student.



Ceramics: BA(Hons) work by Stephen Brown.

An overview of my background and current role at Sunderland

My first degree was in Illustration at the University of Westminster, Harrow. All my

work has a strong focus on drawing and at Harrow I started to apply my illustrations to ceramics using transfer-printing processes. This led me to the Ceramics and Glass department at the Royal College of Art, where I applied these print techniques to glass. After this I did a practice-based PhD at the Centre for Fine Print Research at the University of the West of England in Bristol. I'll discuss this a little later.

I joined the University of Sunderland five years ago and now lead post-graduate studies in glass and ceramics. I am programme leader for our MA in Glass, which has around 26 students at present and I supervise our six research students.



Cell of Himself. Kevin Petrie, 1995. Printed glass

An outline of my PhD - An example of art and science collaboration.

My PhD at UWE was an inter-faculty project between 'Art, Media, and Design' and 'Applied Sciences'. Both Faculties appointed a full-time PhD research student with a bursary. This was Alison Logan in Applied Sciences and myself in the art area. Our final PhD titles were:

Kevin Petrie

Water-based ceramic transfer printing: The development and creative use of a new on-

glaze screenprinting system.

Alison Logan

The development and testing of novel on-glaze water-based transfer printing processes for decorating ceramics.

The project related to the development of water-based ceramic transfer printing as opposed to the traditional solvent-based method. Ceramic transfer printing is one of the prime methods for decorating industrial ceramics. It has also become an important process in the artists' cannon of techniques. This has been popularized to a large extent by Paul Scott's book, *Ceramics and Print*. However, at the time there were several potential problems with the use of the process:

- Environmental and Health and Safety legislation limits the use of solvents used in transfer printing.
- No affordable alternatives available
- This restricted use for the creative user

Although Alison and I ultimately produced separate PhDs – each with an individual focus - we worked together at various points throughout the project and both gave each other the benefits of our individual expertise. For example, I remember working with her one day on standardised tests. I mixed the powdered enamel colour with a printing medium to form an ink. When I thought it was the right consistency I said, “That feels right”, and she said, “How do know”? So it made me consider and communicate my tacit knowledge in order to help Alison understand the process. In turn, Alison helped to introduce the need for consistency and repeatability.

Ultimately we produced a new process that was patented, which now is in use in many art schools. I produced a body of artworks that developed and demonstrated the creative use of our system and Alison produced a body of work analysing it – for example dishwasher tests. We also undertook a number of industrial trails including some with Wedgwood.



PhD works by Kevin Petrie

It also seems appropriate to mention, as a side issue, that Alison and I attended a similar event to this called ‘Science and Art in Ceramics’ at the Royal Institute in London in 1996. We won a prize for best student poster. So it was interesting at this event, nearly ten years later, to see what developments have been made.

Just before I move on to give some examples of post-graduate research at Sunderland I will mention my current research. In the last three years this has focused on the subject of glass and print. This has included writing a book, *Glass and Print*, which will be published next year by A&C Black. The page below relates to a new glass/print process

that I developed with the aid of a grant from the Arts and Humanities Research Board. (AHRB) called *Integrated Glass Printing*. This process combines traditional kiln forming methods with the industrial print process Flexography to create glass prints in which the glass form and the printed image are fully integrated. This might well form the focus for a future presentation.

CASE STUDY: KEVIN PETRIE

'Drawing has always formed a central strand of my practice. Over the years I have explored a range of methods to translate the experience of specific places, events and people through drawing into a permanent state, thus "fixing" the experience. This has involved making objects in ceramic, glass and enamel to form a context for the drawn image. Printing has been used as means of transferring the drawn image to the object.

'The development of integrated glass printing enabled me to bring together my interests in drawing, printing and object-making to create celebratory objects. The fact that the pieces are translucent adds a dimension not possible with other media. As light passes through them the pieces are "brought to life". They also change as the light changes. This gives a sense of passing time, adding an

important contrast to the "fixed moment" as recorded in the drawn, printed image. Both opaque and transparent glass can be used to modify the transmission of light.'



Wearside view (detail), Kevin Petrie, UK, 2004. Integrated glass print made with Bullseye frit, 29 x 21 cm. Note the relief surface of the black-line areas.



Wearmouth Bridge, Pastel and watercolour, 2004

The Wearmouth Bridge (detail), 2004. Integrated glass-print dish made with Bullseye frit, 50 cm diameter. Note how light is allowed through the areas in the sky where clear frit has been used, and how it is blocked by areas of opaque frit, for example, in the green of the bridge.



An introduction to relevant post-graduate research at Sunderland

This final section will outline some of the MPhil and PhD research at Sunderland.

Sunderland has a relatively long history of practice based PhD research. The first successful project was completed by Anne Douglas in 1992. This project related to sculpture. Several of our research projects have involved supervision from both an art and materials technology specialist. The materials technology input was undertaken by Dr Collin Gill, who sadly died last year. This role is currently being filled by our Associate Dean Dr David Taylor and a former colleague of Colin's Dr Doug Grozier.

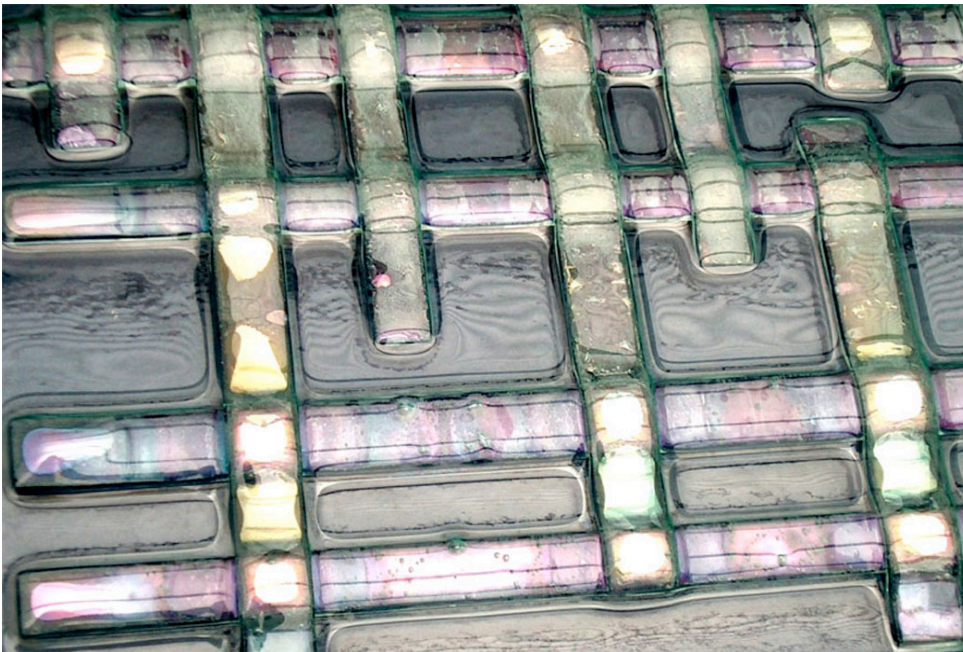
The work below is by Dr Laura Johnston, our first completed practice-based PhD in Glass. The project was entitled, *The innovative application of the coated glass surface in architecture*. Colin Gill played an important role in this project, along with my colleague Mike Davies – Reader in architectural glass. Laura's PhD focused on surface coatings on glass and especially dichroic glass. Colin helped in the understanding of the materials and processes involved and also helped Laura to develop her own coated glass at the university. Mike helped develop the creative approaches to producing site-specific projects. This has enabled Laura to develop a very successful architectural glass practice.



Architectural piece by Dr Laura Johnston

Eileen Leatherland - Possibilities for the creative use of low emissivity glass by surface coating manipulation within an architectural context.

Eileen Leatherland is in the first year of a part time MPhil project focused on architectural glass. She has discovered that the manipulation of the surface coatings of certain types of glass under various firing conditions can produce a range of iridescent surface effects. Her project will firstly focus of developing a working methodology to control this 'palette' of effects. She will also have contact with materials technology specialists to gain a basic understanding of why these effects occur. The ultimate aim is to use the methods and effects that she develops to produce a model of creative practice in the form of a body of artwork. Here you see a visualisation of a possible project. It is hoped that Eileen's work may offer alternatives to the rather expensive coated glass, such as dichroic.



An early test piece by Eileen Leatherland

Carol Metcalfe - New Ash Glazes from Arable Crop Waste:

*Investigating the creative use of straw from *Pisum sativum* (Combining Pea) and *Vicia faba* (Field Bean)*

Ash glazes on ceramics have a 3500-year history. Carol Metcalfe has developed a range of new glazes from the crops that she grows on her farm. This provided a more sustainable source than the usual tree ash. She has also produced an analysis of the components of the ash in order to understand the resulting effects seen in the fired glaze. Her own artwork will provide examples of how one artist might use the glazes. This is extended with a number of case studies of artists working with ash glazes.

Key words: Arable - Waste - Ash - Environment - Glazes - Stoneware

Methodology - Practical Analysis

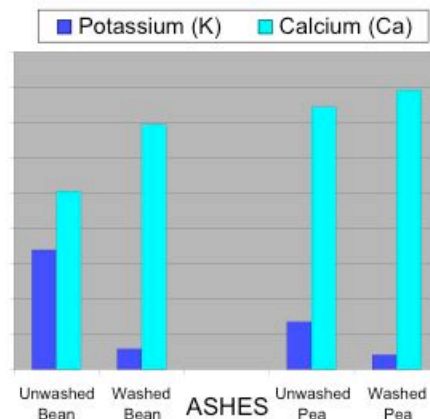
● EDX analysis comparisons

- Pea & bean
- Washed & unwashed
- Other ashes in use
- Harvest seasons

● XRF analysis of oxides

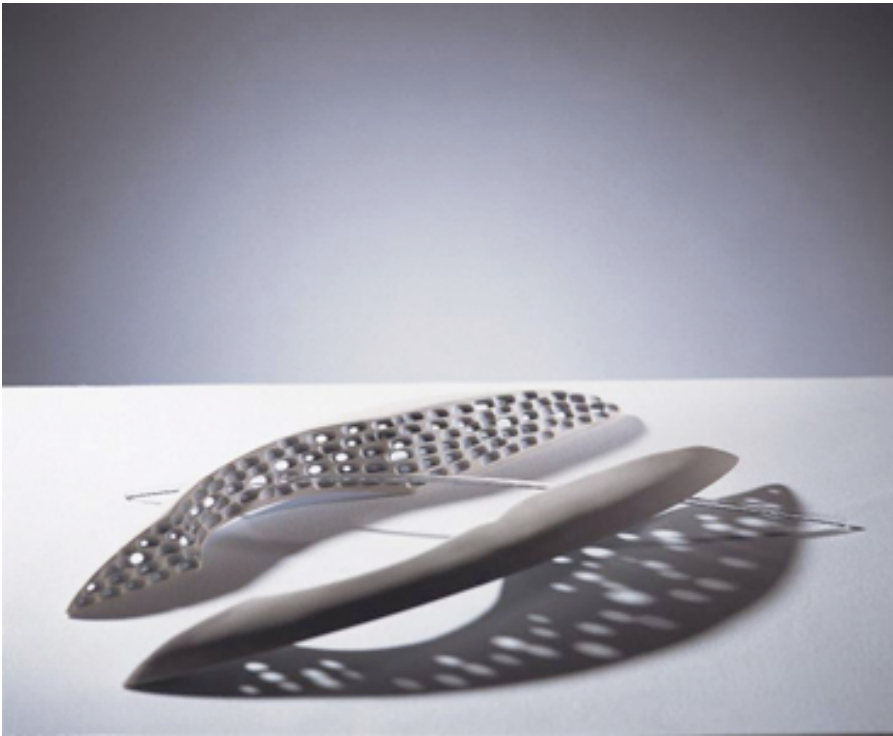
- Glaze calculations
- Inform tests

● Ceramic review



Jessamy Kelly - The combination of glass and ceramics, with an emphasis on light as a means of expression in artistic studio practice.

Jessamy Kelly is a designer for Edinburgh Crystal and is in her first year of a part time PhD at Sunderland. Jessamy is exploring a range of possibilities for combining glass and ceramics with the aim of modifying the translucency. She is in the early stages of producing exploratory tests.



Balance. Jessamy Kelly. Ceramic and glass

Vanessa Cutler - Investigating the creative uses of abrasive water-jet cutting for glass within the glass artist's studio with particular reference to architectural glass.

Vanessa Cutler is in the final stages of her research project and is also working as a research associate to facilitate the use of the water-jet cutter. She worked closely with

Collin Gill to develop a series of standardised tests to explore the parameters of various types of cutting in glass. This inspired the development of a body of artwork. For example, this piece evolved out of a set of piercing tests. Vanessa's work falls into two broad areas; those that relate to architecture and more autonomous objects such as this blown glass plate which has been water-jet cut. Vanessa's thesis will also contain a number of case studies in which she has used the substantial knowledge that she has gained to assist other artists to realise projects. This includes works by glass artist Richard Mietner, sculptor Conrad Atkinson, and recent RCA graduate Esther Adesigbin.



Finger tips – pink. Vanessa Cutler. Water-jet cut blown glass

Jennifer Antonio - Applied and residual surface coatings on glass:

The development and creative use of new methods to create images in glass.

Jenny Antonio is based in Edinburgh and is in her second year of a part time PhD. Jenny has discovered that if she removes the tin coating on the surface of float glass and then free-formed it in the kiln the glass developed a slight curvature of the surface where the tin has been removed thus creating an image in the glass.



An early test piece by Jennifer Antonio

Jenny has said of her research, “I have been collaborating with material-scientists and a mathematical modeler to try to explain the effects and find out how to control them. We have developed a language of mutual understanding through this dialogue. I have had to learn how to describe some of the underlying motivation and values driving my creative work to the scientists, and they have had to refine their own descriptive skills in their efforts to explain their understanding to me”.

This seems to me to sum up something of the aims of the Atoms to Art networking conference and so seems an appropriate point to conclude this paper. But just before I finish I would like to mention the gateway to glass website that we have developed at Sunderland (gatewaytoglass.org). This is an educational resource for glass, which contains sections on research and also a referred journal section. We would welcome any submissions for articles. And finally - if you find yourself in the North East please come and see us – we would be very happy to show you around our department.

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