SOFT GLASS – THE AESTHETIC QUALITIES OF KILN FORMED GLASS WITH RECYCLED INCLUSIONS

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Abstract

My research is about combining recycled materials with glass structures to produce textile artworks that have unique aesthetic qualities and a considerable lifespan. This thesis examines the technical development of kiln-formed glass voided structures, the aesthetic qualities of colour and softness and the effect of the research experience on my practice. The practical element of the research consisted of 18 experiments inspired by visits to the Seychelles and Barbados. The technical development was informed by concepts of being and non-being and by glass-making processes dating back to 1650 BC in Northern Mesopotamia, as well as fabric manipulation techniques thought to have originated in the fourteenth century in Sicily. Some 37 technical principles were discovered together with documented firing schedules that could be generalised to kiln-formed glass making. In terms of artwork aesthetics a methodology was developed that identified 32 qualities informed by colour theories. To eliminate errors in terminology the origins of each of these colour theories were identified and described using examples of artworks from living artists. The main aesthetic qualities identified were light/dark contrast, colour direction in terms of composition and optical colour mixing, with the latter being traced back to theory associated with early Christian glass mosaics. I also discovered how my roles of artist maker and researcher led to insights that contextualised my practice the most profound of which resulted from revisiting an experimental failure, which led to the identification of a new aesthetic quality of softness based on visual perception rather than tactile response. In my conclusion I describe experiments that link softness to future products and artworks that further explore colour direction, being and non-being.

Acknowledgements

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Contents

Appendices

List of Illustrations

Chapter One

Introduction

Background

This thesis details my journey through a series of experiments that investigates a new technique of **kiln-formed glass**[1] that allows the insertion of coloured **recycled inclusions** into voids within glass. The discovery of the new technique came about as a result of the **fabric manipulation** process known as **Trapunto** that used two layers of fabric stitched together to create voids into which scraps of materials are stuffed to create a raised surface. I visualised the substitution of the layers of fabric with glass and the stuffing consisting of **recycled textiles** and **found objects** (AL1:1)[2]. I was also aware that the research required complex technical knowledge of making which currently did not exist (AL1:2).

Textile Sculptures

The starting point for my journey explored the statement made about textile sculptures by Jac Scott, who wrote:

> The thread that links all artists featured is their relationship to textiles and sculpture – that is, either they employ a textile content, with alternative media, in their three-dimensional work, or they utilize techniques normally associated with textiles, but with other materials. (Scott, 2003:9)

An entry into the Aesthetic Log relates the idea of fabric manipulation processes with that of glass (AL1:3):

> *Scott's definition of textile sculpture – so a textile sculpture does not have to contain textiles providing that it relates to a textile process or textiles combined with non-textiles... Fabric manipulation processes... It would be good to combine these processes with my knowledge of glass. The glass could protect the textile.*

[1] Words in bold are defined in the Glossary of Appendix 1.
[2] Extracts from the Aesthetic Log which include personal diary entries are numbered sequentially according to chapter and appear in Appendix 2.

My research identified two main categories of **fused** and **slumped** glass, which included a textile process within its design (AL1:4). The first represented a textile or process but did not use textiles, the second employed actual textiles externally to the glass. Figure 1.1 shows the work of Karen Akester, who uses a smock dress to produce an imprint into a mould, which was then used to produce a three-dimensional textile image on the top surface of the glass.

Figure 1.1 Akester, K., (2007) Folded Dress: Button Detail [Glass] *in* Cummings K., (2009:125)

Figure 1.2 shows the work of Diana Dias-Leaŏ who combined iridescent glass, crystals and fine silken yarns to create a fantasy range of opulent glass dresses. The yarns were threaded through drilled holes in the glass as a method of **constraint** and **embellishment**, making the textile element external to the glass.

Figure 1.2 Dias-Leaŏ, D., (2005) Ceramic and Glass Dress [Glass, Ceramics and Textiles] *in* Christley, J. and Evans, C., (2006:39)

This research did not find any combination of fused or slumped glass where textiles were internal to the design, therefore I made a judgement about this becoming the focus of the research (AL1:5).

Significance of Glass

For me, the optical qualities of glass have a seductive beauty that is unrivalled. The **refraction**, **reflection**, **transmittance** and **absorption** of light create an infinite series of relationships between light and colour. It is also full of contradictions, simultaneously there but almost invisible; it reveals or conceals through its **transparency** or **opacity**, is fragile but strong, and physically hard but soft in appearance. In its **cold state** it is fixed and offers a lasting protective quality but when heated becomes fluid and flexible creating soft-edged, unconfined forms due to nature's gravitational forces. The material process can be both an exciting one when it provides pleasant unexpected revelations but also heart-breaking when things go wrong during the **firing process**. Whilst glass as a single medium is diverse, this research looks at how its interaction with recycled inclusions can be optimised to discover new and unexpected possibilities for use as an artistic medium.

Significance of Recycled Inclusions and Found Objects

The use of recycled inclusions as opposed to other inclusions is both practical and personal. The majority of recycled inclusions used in the research were **discarded textiles** collected from visited places, which offered a readymade palette of vibrant and faded colours, which meant that time-consuming hand dying was kept to a minimum. The discarded textiles when **deconstructed** and manipulated produce **aesthetic qualities** based on complex **textural structures** and **colour relationships** that could be quickly tested during the research. Whilst recycling can be used to make a statement about a waste-producing society or as an expression of our over-consumer society to the detriment of the planet, my interests are more cultural. People that live on remote islands do not have the luxury of being able to buy art materials and often make use of the discarded materials around them, turning them into beautiful artefacts.

Figure 1.3 Island Art from Discarded Materials – Author's Own Collection

Figure 1.3 shows two such artefacts from my large collection: on the left is a painted leaf from the Seychelles and on the right is art made from a discarded oil drum from Barbados. Functional objects such as hats made from palm leaves (which are almost indestructible) and **steel pans** made from large oil drums that give that wonderful musical sound would probably not have the same properties if made from materials that are purchased. For me, the artefacts and functional items seem to *capture the spirit* of the island through the use of the discarded materials and reinforce my memories of a visited place. In just the same way, I like to use discarded materials either from places visited or from those I have collected over time to make my art and preserve them for life within the protection of voided forms.

Practice Led Research

This research can be divided into (1) the technical development of making the glass, (2) the inclusions that are used within the glass, and (3) the effects of colour which combine to give the work its aesthetic qualities. This can be represented as an initial **conceptual map** by using three intersecting circles as shown in Figure 1.4. Each intersection represents a combined aesthetic quality: glass and colour; colour and inclusions; inclusions and glass. There is a point in the centre of Figure 1.4 where all circles intersect and represents the unique aesthetic qualities of my work.

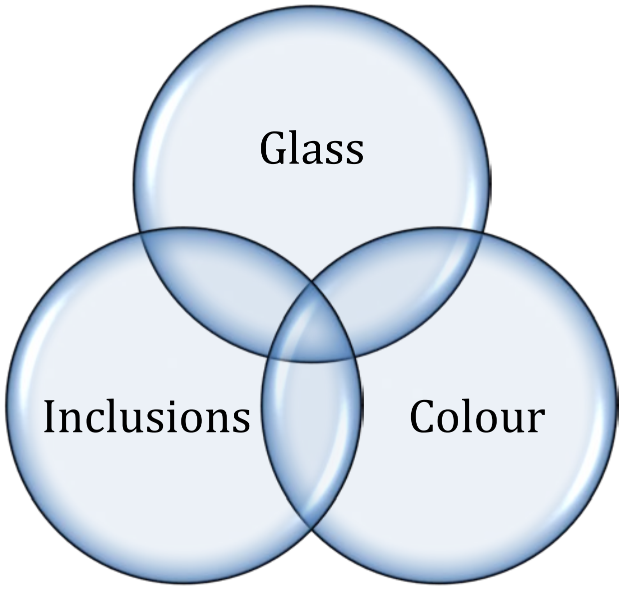

Figure 1.4 Topham, S., (2013) Initial Conceptual Map [Diagram]

Research Questions

The three questions that I wish to explore in my thesis are:

1. Can I create a complex kiln-formed glass **voided structure** that supports itself?
2. Can I trace and articulate the consequences of this technological development in my own **artistic practice** and in particular assess the aesthetic qualities when combined with recycled inclusions and found objects?
3. Can I draw insights into my relationship with the **material processes** as a way of further understanding my own artistic practice?

Presentational Issues

In presenting this thesis I am critically aware of two issues: the first is that seeing my work in **digital imagery** is no substitute for seeing it under **controlled illumination**. The aesthetic qualities, namely detail, colour, reflected light and the three dimensional effect of the surface, are all negatively affected by the digital imagery. To this end a

CD Rom is attached (described in Appendix 35) to the rear cover of this thesis, which at least allows the viewer to see the inclusion detail of each experiment. The second issue is that creating visual artwork and writing about it involves two different media and an exact translation is difficult, although having said this, I was inspired by the style of the thesis by Reiko Goto Collins (2012) which made the task easier (AL1:6). Throughout this research I kept an **aesthetic log** which contains several types of data and imagery including digital photographs of work in progress and finished artworks together with my observations. Some observations were audio recorded in **real time** and transcribed, whilst others were written retrospectively after the event. In both cases the original wording and styles have been preserved unedited and included as extracts in the thesis.

Structure of Thesis

This thesis is divided into a number of chapters which can be outlined as follows:

Chapter One describes the personal motivations, gaps in knowledge and practice, research questions, initial conceptual map and Aesthetic Log.

Chapter Two describes the significance of the voided glass structure through the concepts of inside/outside and being/non-being; historical perspectives of ancient glass **core forming** and trapunto fabric manipulation. It concludes with an explanation of the **inclusion parameters** and **glass parameters** that expand the initial conceptual map.

Chapter Three describes the significance of **colour theory** to this research study. In this chapter I propose the theory that **colour contrast**, **colour composition** and **colour optics** are more accurate concepts to explain the aesthetic qualities of this research study. I propose that the point at which the three intersecting circles meet represents the unique characteristics of this research work. I also propose that this point of intersection can be translated into a matrix and linked to colour theory using artworks from current-day practicing artists and a piece of preliminary work from this research study. The chapter concludes with a summary of the aspects of colour theory that directly relate to the matrix positions.

Chapter Four begins with a discussion of my practice and the tensions between the anticipated roles of **artist maker**, **designer maker** and **researcher maker** during the research. It begins with brief descriptions of the main preliminary experiments significant to this research, concluding with the commissioning of a new kiln specifically for the research study. This is followed by 12 small glass experiments which are discussed in terms of inspiration, technical principles and colour theory, and includes a field trip to the Seychelles in the Indian Ocean. Reference is made to the many problems which needed to be resolved as the experiments progressed, all of which appear in the Aesthetic Log extracts. The chapter is concluded with a summary which reflects on my role as artist maker, designer maker and researcher maker.

Chapter Five explores a further six large glass experiments (over 2,000 cm^2) using the 27 technical principles identified in experiments 1 to 12 of the previous chapter. The theme for the large glass experiments was based on a field trip of mine to Barbados. I then identify a further 10 technical principles, and discuss a change in emphasis in terms of colour theory. I also review significant contributions as a result of research with the Corning Museum of Glass in the USA and the Bauhaus Archives in Germany. Moreover, reference is made to the difficulties of working processes due to the larger sized glass. The chapter is concluded with reflections on the six experiments as a whole and the impact of the experience on my practice.

Chapter Six describes how the failure of experiment 9 led to the identification of **softness** as a significant aesthetic quality and one which contextualised the research into textile sculptures and placed my practice firmly within the field of textile art.

Chapter Seven concludes the thesis by revisiting the three research questions and the findings associated with the conceptual framework. This is followed by an explanation of a number of my insights and how these findings can be generalised to the field of art and design and beyond. The limitations of the research study and areas for further research are discussed. In addition two further experiments are described which explore the potential of softness, colour direction and the concepts of being and non-being. The chapter is concluded with a reflective statement about my journey and what the PhD process did for me.

Chapter Two

Historical and Contemporary Contexts

The Significance of Glass Voids

The Oxford Dictionary (2013 [Online]) defines the noun *void* as, 'a completely empty space… as in an unfilled space in a wall, building, or other structure or an emptiness caused by the loss of something.' This definition suggests a tendency to think about voids as being insignificant because of their emptiness. The glass dish produced by Cooley (no date) shown in Figure 2.1 has voids which, although empty[3], add to the aesthetic qualities of the glass dish, and therefore I would argue that emptiness does not automatically equate to insignificance (AL2:1).

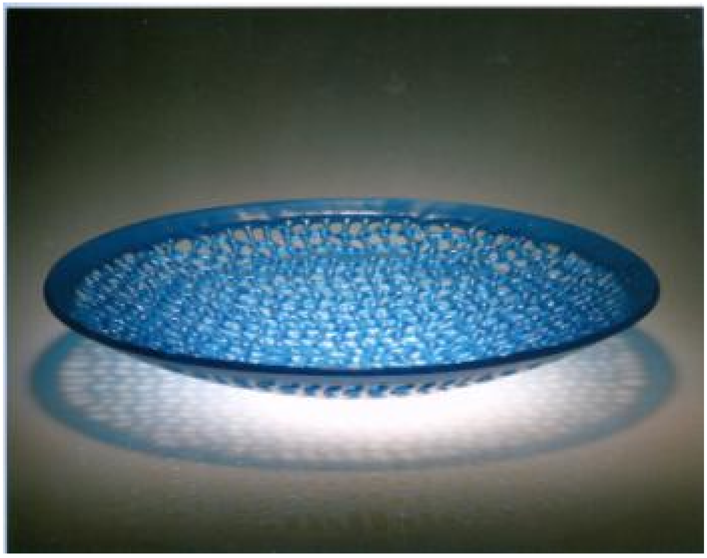

Figure 2.1 Cooley, J., (no date) *Glass Dish* [Fused and Slumped Glass] *in* Christley, J. and Evans, C., eds. (2004:18)

The *Memory Dress* produced by Dutton (2001) shown in Figure 2.2 has a base fabric made from recycled scraps of clothes and on its surface net pockets where stamps, shells and jewellery are placed invoking memories of times gone by. The net pockets are voids of empty space which allow items to be stored inside them.

[3] For the purpose of this thesis the physical presence of air within a void will be ignored.

Figure 2.2 Dutton, J., (2001) ***Memory Dress*** **[Fabric and Found Objects]** ***in***
Exhibition Catalogue: Inspirations: The Textile Tradition Then and Now (2001:25)

Bachelard (1969:211) states that the words outside and inside form a **dialectic** of division and one which blinds us as soon as we bring it into our thoughts. The application of this idea to the memory dress was recorded in the Aesthetic Log (AL2:2):

> *The gaps in the net make it transparent so I can see the items inside the voids from the outside. I can see the contour on the outside caused by the shape of the void space inside. I can see that the inside provides a degree of physical security for the objects from the outside environment.*

Viewing the inside from the outside is a common feature of fused and slumped glass but not in association with internal voids. The work of Aldridge (no date) shown in Figure 2.3 is a case where the metals on the inside can be seen from the outside.

Figure 2.3 Aldridge, L., (no date) *Glass Dish* [Fused and Slumped Glass] *in* Cummings, K., (2009:106)

Cummings (2009:106) describes Figure 2.3 as trapping a variety of metals between two sheets of glass before fusing and slumping. The key word in this description is *trapping* because it indicates that glass has been allowed to flow over the trapped metals without the creation of any voids. One element of this present research is to explore fully the transparency of the glass so that inclusions placed within the inside voids can be seen from the outside (AL2:3).

During the review of contemporary glass artefacts I did not find any examples of fused and slumped glass that made use of voids enclosed inside the glass, and therefore the relationship between inside void space and outside contour did not exist. However, examples of three-dimensional contours on the outside of the glass produced by the technique of slumping were found. Figure 2.4 shows the work of Polish artist/architect Urbanowicz (2003), who produces large glass installations for architectural use. The process uses thick sheets of glass laid upon a bed of **fine refractory material,** which is then slumped in a kiln to create unique textures on the outside glass surface.

Figure 2.4 Urbanowicz, T., (2003) *Catch a Wind* [Slumped Glass] *in* Moor, A., (2006:159)

Figure 2.4 shows the side of the glass which is contoured, and whilst the contours can be seen through the glass from the other side due to its transparency, that particular surface remains flat. The question now arises as to whether the voids on the contoured surface are on the outside or inside. It could be argued that because the voids have depth and sink into the glass, the voids are on the inside of the glass. However, I would suggest that the voids are on the outside external surface of the glass because there is no void space buried within the structure. It is my intention to explore the relationship between the inside void and the outside contour that it produces (AL2:4).

Glass affords an excellent protection to non-combustible fine threads and metal foils inside the structure against external environmental contaminants and human interference.

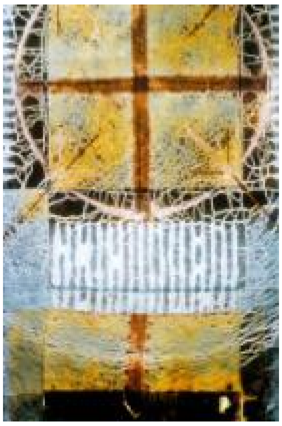

Figure 2.5 MacDonald, S., (no date) *Bowl*
[Fused Glass and Heat Resistant Inclusions] *in*
Cummings, K., (1997:70)

Figure 2.5 shows the work of MacDonald (no date), who exploits the different reactions of copper wires, gold and silver foils. The protection of inclusions against outside elements, with the aim of extending the life of the artwork, was one of the original considerations that directed my practice (AL2:5).

Bachelard (1969:212) states that 'philosophers when confronted with outside and inside think in terms of being and non-being'. Lao Tzu[4] wrote his thoughts associated with being and non-being in chapter 11 of the *Tao Teh Ching*. Kimura's (2004:33) translation reads as follows:

> Thirty spokes share a hub;
> The usefulness of the cart
>   lies in the space where there is nothing.
>
> Clay is kneaded into a vessel;
> The usefulness of the vessel
>   lies in the space where there is nothing.
>
> A room is created by cutting out doors and windows;
> The usefulness of the room
>   lies in the space where there is nothing.
>
> Therefore,
> The benefit of things lies in the usefulness of nothing.

[4] Lao Tzu wrote the ancient Chinese text *Tao Teh Ching* in the sixth century BC (Kimura, 2004:2)

The spokes and hub, clay vessel and room are the ‘being’ and the ‘nothing’ is the non-being. Thinking about it in this way highlights the significance of the void space (non-being) to the research journey. It focuses on the non-being as a way of creating the being. However, just like the wheelwright, potter and architect, whilst they derived their objects from nothing they also needed the knowledge of the being as a means of visualising the final product. Thinking about my practice in this way helped me to see a greater connection between the artist and researcher (AL2:6).

Trapunto Fabric Manipulation

My knowledge of being begins with the understanding of a fabric manipulation process known as trapunto.

Aesthetic Log (AL2:7):

> *I want to find out all about trapunto, not only for the sake of historical context but also to discover the processes used to make it. I hope to learn from these processes to help me make my own artwork.*

The research started with the etymology of the word *trapunto*[5], which was found to date back to c. 1924 and be of Italian origin, meaning ‘to embroider’. The present usage of the term trapunto is used to describe the fabric manipulation technique that creates a noticeably raised surface design through adding textile inclusions into voids between two layers of fabric (Figure 2.6).

[5] The Italian translation for the word trapunto is trapuntare (WordReference, 2014 [Online])

Figure 2.6 Lees, W., (no date) *Sea Urchin* [Textile] *in* Lees, W., (1991:113)

There is evidence to suggest that a raised fabric manipulation technique could have been used as far back as c. 3400 BC. A small carved ivory figure housed in the British Museum, possibly of a pharaoh of the Egyptian First Dynasty (c. 3400 BC), shown in Figure 2.7, was found to have clear carved markings of a raised design on its robe. Whether this raised design was originally produced by fabric insertions within voids or by other means cannot be identified, however it does display a significant degree of raised decoration.

Figure 2.7 *Ivory King*, Egyptian, c. 3000 BC, height 8.8 cm [Ivory] [6]

[6] Registration number: 1903,1010.1 (image © The Trustees of the British Museum).

The earliest surviving examples of trapunto are a collection of two textiles known as the Tristan or the Guicciardini quilts. One of the quilts is owned by the Victoria and Albert Museum in London, and the other by the National Museum of Bargello in Florence. A section of the quilt from the Victoria and Albert Museum is shown in Figure 2.8.

Figure 2.8 *The Tristan Quilt,* c. 1360 – c. 1400, height 320 cm, width 287 cm [Textile][7]

The quilts show episodes from the Norman legend of Tristan and were thought to be gifts given to Pietro di Luigi Guicciardini and Laodamia Acciaiuili to celebrate their wedding in 1392 AD. My research found that whilst the wedding could be confirmed, there was no evidence to suggest that the quilts were given as wedding gifts (V&A, 2011, [Online]). The quilts were thought to have been Sicilian, a fact supported by the research of Rajna (1913:517), owing to Sicily being a major centre for embroidery and lacework at that time. Furthermore, both the Victoria and Albert Museum and the catalogue of the Museum of the Palazzo Davanzati in Florence, Italy describe the Tristan quilts as Sicilian. I would therefore suggest that the combination of supporting evidence rather than factual records indicates why historical resources refer to the origins of trapunto as being around the fourteenth century in Sicily.

[7] Registration number: 1391-1904 (image © Victoria and Albert Museum).

My research confirmed that the trapunto fabric manipulation technique was used on the Tristan quilt:

> Part of a quilted linen coverlet probably for a bed with scenes from the legend of Tristan outlined with brown and white linen thread in backstitch. With this form of quilting, trapunto (stuffed quilting), the design is brought up into relief where required; the threads of the backing are pulled apart and rolls of cotton are inserted, with also some cord quilting. (V&A, 2011, [Online])

Originally, it was suggested that these textiles were primarily used as highly decorative bed coverlets, however research by Randles (2009:113–117) suggests that the two Tristan quilts were originally joined into one large quilt. Randles explains that whilst the size of such a quilt was appropriate for large fourteenth-century Italian beds, there is no indisputable evidence as to the quilt’s use. An ultra-violet light test of the back of the Bargello Tristan quilt reveals traces of calcium that could have resulted from its placement on a wall, indicating that it may have served as a wall hanging (V&A, 2011, [Online]). The use of textiles as wall hangings was not uncommon in dwellings during the medieval period (Thornton, 1991:48).

Aesthetic Log (AL2:8):

> *I feel some comfort today because I have found a relationship between trapunto and wall hangings. It gives me inspiration to continue with the idea of wall-mounted artworks.*

The research found that raised designs became very popular amongst royal families in Europe, especially in Tudor England (1485–1550). The Society of Antiquaries of London (James, 2010, [Email]) confirms that Henry VIII’s household inventory dating back to 1547 lists a number of bed coverlets and garments with raised designs. However, because none of these textiles have survived, the fabric manipulation technique cannot be precisely determined. However, my research did find visual evidence that trapunto was used in Europe during the nineteenth century to decorate dresses, hems of petticoats, jackets, vests and caps, lending them weight and stiffness and adding decoration without making them too bulky (AL2:9).



Figure 2.9 **Figure 2.10** **Figure 2.11**

Figure 2.9 ***Women's Dress,*** **c. 1820 [Textile][8]** ***in*** **Rothstein, N., (1984:131)**
Figure 2.10 ***Silk Dress with a Figured Leaf Design,*** **c. 1823 [Textile][9]** ***in*** **Rothstein, N., (1984:34)**
Figure 2.11 ***Pink Trapunto Hat,*** **c. 1920 [Textile] (courtesy of C., Shiveley)**

Trapunto can clearly be seen on the hems of the dresses shown in Figures 2.9 and 2.10 from the nineteenth-century Victoria and Albert Museum collection. This research also found that trapunto continued to be used in the twentieth century, as can be seen on this 1920s cloche hat in Figure 2.11.

Trapunto was introduced to America by European immigrants in c. 1700 as a quilting technique (Shaw, 1993:17) for bed covers, primary for warmth. Quilting became extremely popular during the American Civil War (c. 1865) to raise money for the war effort but by this time and its primary use had transferred to one of decoration (Shaw, 1993:19). Figure 2.12, shows an American quilt from c. 1860 where

[8] Image © Victoria and Albert Museum.
[9] Image © Victoria and Albert Museum.

decorative trapunto was used for the raised design of the stalks and sunflowers (AL2:10).

Figure 2.12 ***Sunflower Quilt,*** **c. 1860, 84 x 75 in., [Textile]** ***in*** **Shaw, R., (1993:28)**

Trapunto was known for being a fairly laborious and time-consuming technique, therefore the women of America turned their hand to other quilting techniques such as patchwork, which became immensely popular between 1820 and 1880 (Shaw, 1993:22). Quilting in general continued as a pastime until the bombing of Pearl Harbour on 7 December 1941, when most women had to work outside the home to help the war effort, with a similar situation existing for women in Europe. It was not until 1976 that quilting was revived in America, Europe and Australia, where it still remains a popular textile craft (Shaw, 1993:22).

Florentine Trapunto

In 1974 Newman (1974:198) described a technique of Florentine trapunto, whereby the fabric on the top layer was totally transparent and colourful yarns were used as the stuffed inclusions, allowing the colour, pattern and texture to show through. Whilst the Victoria and Albert Museum (Smith, 2009, [Email]) and Museo di Palazzo Davanzati, Florence, Italy (Museo di Palazzo Davanzati, 2011, [Email]) had no knowledge of the existence of this technique, I found a US patent (Murphy, 1985) which was filed in 1983 (nine years after Newman), entitled ‘Reversible Shadow Multicoloured Trapunto’. The technical field of the background to the invention states:

> The present invention relates to quilting designs and methods of forming quilting designs. More particularly, the present invention relates to an improved method of quilting which forms a reversible shadow trapunto design of multicolour. Even more particularly, the present invention relates to a method and apparatus for forming multi-coloured reversible shadow trapunto designs wherein the colours can be viewed either side of the design, each side being an exact replica of the other. (Murphy, 1985, U.S. Pat. 4,549,494.)

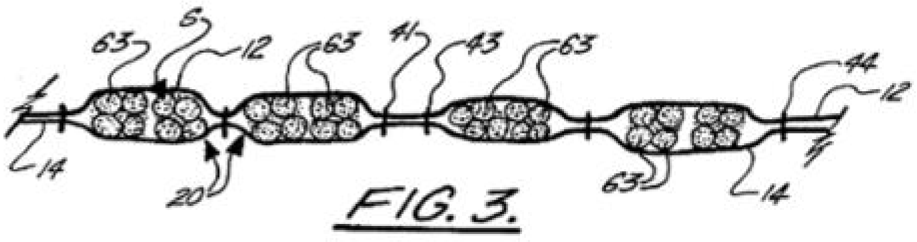

Figure 2.13 Murphy, M., (1985) *Figure 3 of Patent*. [Illustration] *in* U.S. Pat. 4,549,494.

Figure 2.13 shows figure 3 as shown in the US patent, which is a cross-section of the full design detailed as number 10 and is referred to in the text under the detailed description of the preferred embodiment section: ‘Multicoloured trapunto design 10 provides a top sheer fabric layer 12 and a bottom sheer fabric layer 14... A third layer 13 of batting can be added if desired’. Figure 2.14 shows the layer of batting designated as 13 which would tend to suggest the same description of Florentine trapunto identified by Newman in 1974.

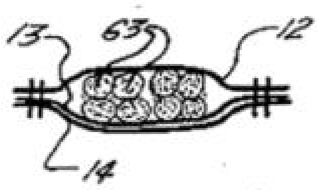

FIG. 3A.

Figure 2.14 Murphy, M., (1985) ***Figure 3A of Patent*** **[Illustration]** ***in*** **U.S. Pat. 4,549,494.**

The findings associated with Newman and Murphy were significant findings in 1974 and 1985 in terms of the link between the fabric manipulation technique and my research.

Aesthetic Log (AL2:11):

> *I am so excited today first the link with Florentine trapunto and now the patent application. The link with trapunto and my work continues to grow stronger. Both allow an opaque background to be inserted.*

Trapunto Techniques

In my literature review into trapunto, I continued to explore how it was made in an attempt to establish whether such findings would prove useful in moving my research forward. I identified three main techniques used to create the raised effect in trapunto, namely (1) slitting, (2) layering, and (3) stuffing.

***Slitting Technique* –** The first technique, **slitting,** described by Wolff (1996:230) involves cutting a slit into the back of the fabric to create an ideal slot for inserting the stuffing. The slit can then be stitched back together, but this technique results in an untidy appearance, as shown in Figure 2.15.

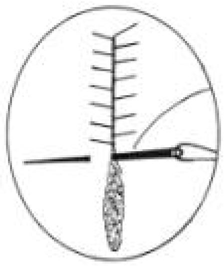

Figure 2.15 Wolff, C., *Closing Cut Opening* [Illustration] *in* (Wolff, C., 1996:230)

Once the stuffing was encapsulated inside the design a high relief pattern was created. Slitting has the advantage of being able to determine the firmness or softness of the piece by how much stuffing is placed between the voids. Wool and cotton are the main stuffing materials used as they give a greater three-dimensional form. My research found that over time, feathers, yarns, rags, woollen blankets and even rice and beans have all been inserted within the stitched designs, creating unusual forms and surface textures.

Aesthetic Log (AL2:12):

> *Recycled? Feathers, yarns, rags, woollen blankets, rice, and beans. Once I have learnt how to create the voided form some preliminary experimentation is needed to determine the type of inclusions and their aesthetic qualities.*

***Layering Technique* –** The second technique, **layering,** described by Wolff (1996:232) involves two layers of fabric sewn together. The fabric is sewn using brown and white linen thread to create a design on the top surface of the material. These designs are highly intricate and are normally associated with nature. Commonly seen were baskets of flowers, cornucopias and fruit designs (Newman, 1974:28). For the top layer natural fabrics such as linen and cotton were used as they were readily available and practical. The bottom layer usually consists of a loosely woven material, for example linen or homespun cotton. Once the fabrics are sewn together, stuffing is inserted into individual parts of the design from the back using a blunt needle. As the loosely woven homespun threads can be worked apart using the needle (Figure 2.16), the stuffing can easily be inserted and then the threads can be worked back to their original position.

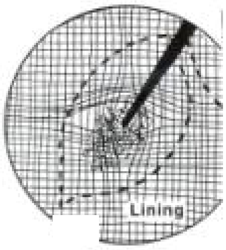

Figure 2.16 Wolff, C., *Stuffing Through Cut Opening* [Illustration] *in* Wolff, C., (1996:232)

***Stuffing Technique* –** The third technique, **stuffing,** described by Newman (1974:199) requires that each shape is stuffed through an accessible opening in the outline stitching or from the edge before closure, as shown in Figure 2.17.

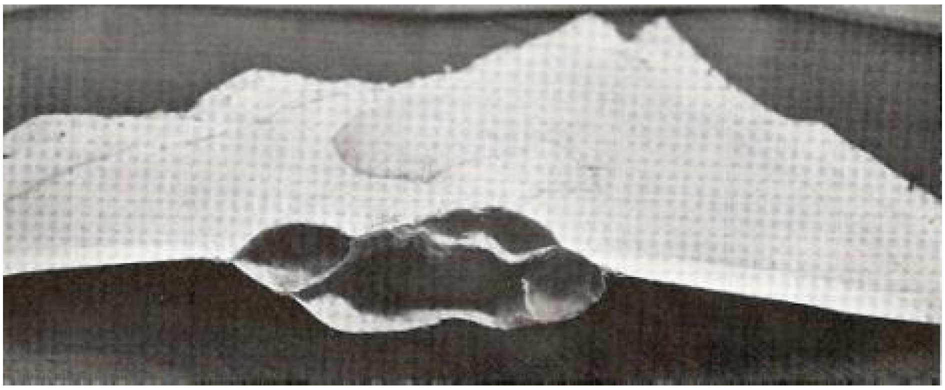

Figure 2.17 Newman, T., *Stuffing Cross Section* [Textile] *in* Newman, T., (1974:199)

In thinking about all three techniques in terms of applying them to glass, layering and slitting require an opening to be created in the rear of the glass to allow inclusions to be inserted. From my experience, given the difficulties of creating holes in glass, the stuffing technique, which uses side access, offers the best solution (AL2:13).

In further researching the stuffing technique I found that Hillyer identified stuffing as the main technique used in the making of the Tristan quilt during conservation work in 2007, writing:

> The fact that the stitching goes through both layers indicates that the stuffing could not have been introduced through the more loosely woven linen of the back of the object. It seems more likely that the outline of each figure was stuffed as the object was in progress, and when the stuffing was in place the outline was closed. The details of the figure could then be embroidered. (Hillyer, 2011, [Online])

Following up on the research of Hillyer, I came across the work of Van den Burghr (2007, [Online]), who suggests that the trapunto stuffing technique used in the making of the Tristan quilts would have required considerable planning in terms of identifying the elements of the design which were going to be raised. **Access points** needed to be planned to provide for the process of stuffing. Raised areas would need to be large enough to accept the stuffing but not too large to allow stuffing to move when inside the void. Over stuffing the work needs to be avoided as this will distort the fabric and design.

Aesthetic Log (AL2:14):

> *Van den Burghr research is really useful it goes beyond the normal explanations of the trapunto technique and in my mind I can see how it would relate to my work but I need to carry out some experiments... Not only will I have to think about the material types of inclusions but also their size and how I manipulate them.*

The Aesthetic Log entry above confirms the discovery of the three inclusion parameters **type, size** and **manipulation** that could be added to the conceptual framework and began to generate ideas for applying the trapunto techniques. Having now understood my work in terms of being and non-being, the next stage in the research journey was to identify how the glass voids could be made.

Core Forming

Aesthetic Log entry AL2:15 prompt the question as to whether **experiential learning** alone is sufficient for my practice and the significance of core forming knowledge to the research study (AL2:16). The process of glass making today conjures up images of **glass blowing** with the craftsman forming the glass shape by blowing down a pipe (punti) into the gather of molten glass, a technique that dates back to the first century BC originating in Syria (Harden, 1969:51). Prior to this period a process called core forming (glass formed around a core) was the dominant method of manufacturing according to Harden[10] (1969:58). My research found that the core forming process was used for making small vessels, mainly around 10 to 20 cm tall, an example of which is shown in Figure 2.18. According to Grose (1989:51), these vessels were used to contain expensive perfumes at the courts of the rich and powerful, as well as being used in religious ceremonies.

Figure 2.18 *Two-handled Krateriskos*, Egyptian, c. 1390 BC – c. 1352 BC, height 8.7 cm [Core-formed Glass][11]

The glass community of today rarely mentions core forming, but when it is referred to, it is synonymous with these vessels rather than the actual process of forming glass

[10] The evidence was based on archaeological finds from several tombs and graves.
[11] Registration number: 4741. (Image © The Trustees of the British Museum)

by the use of core materials, the latter being the focus of interest for the purpose of this research study.

The beginning of the period under research dates back to around 1650 BC, when core-formed vessels in Northern Mesopotamia were first thought to have been produced before quickly spreading to Egypt (Harden 1969:47). What happened to core forming from this time to its decline in the first century BC was extraordinary. During this period, core forming ceased to exist on five occasions: ceased c. 1200 BC[12] – revived c. 750 BC; ceased c. 612 BC[13] – revived c. 539 BC; ceased c. 400 BC[14] – revived c. 350 BC; ceased c. 323 BC[15] – revived c. 150 BC; and ceased c. 50 BC[16].

On each cessation and subsequent revival, the form and decoration of the core-formed vessels was significantly different, suggesting that the knowledge and skill of core forming was not automatically passed on from one revival to another. Matsushima (2004, [Online]) supports this suggestion indicating that although recipes for making glass were preserved in the **cuneiform tablets**, it appears that the Egyptian glass workers guarded the secret of core forming very closely, for neither the Hittites of Anatolia nor the Minoans and Mycenaeans of the Aegean mastered the technique, as there are no such archaeological finds in the Bronze Age sites of these regions. One tentative explanation for this conservatism, which centred on the special position that these products held in society (Matsushima, 2004, [Online]).

---

[12] Egypt was attacked and the contemporary cultures of Mesopotamia weakened and fell into a severe decline (Grose, 1989: 59).
[13] The Assyrian Empire was defeated in 612 BC by the Persians (Grose, 1989: 73).
[14] The reason for this cessation of glass production has yet to be established by archaeologists (McClellan (1985) cited in Grose, 1989: 115).
[15] After the death of Alexander the Great in 323 BC his empire became a battlefield for his successors, and production of many goods, including glass, ceased (Harden, 1969: 11).
[16] Invention of glass blowing (Harden, 1969: 51).

Cummings (2002:26) describes core forming as 'the coating of a friable core with a homogeneous coating of glass. The core is removed when cold creating a small container form'. Figure 2.19 shows a cross-section of a core-formed vessel before the rod and core are removed.

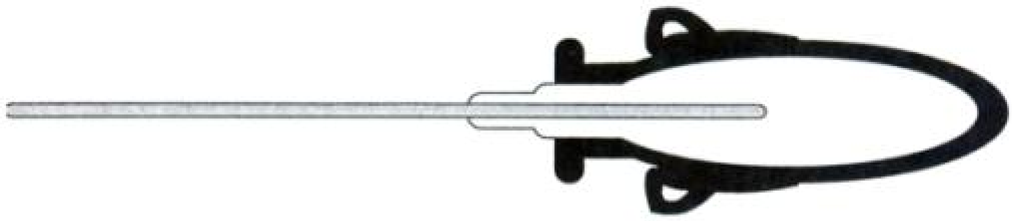

Figure 2.19 Cummings, K., *Cross-section of Core-formed Vessel* [Illustration] *in* Cummings, K., (2002:26)

An initial sketch Figure 2.20 of a visualisation taken from the Aesthetic Log (AL2:17) indicates the significance of glass forming around a core to the research study.

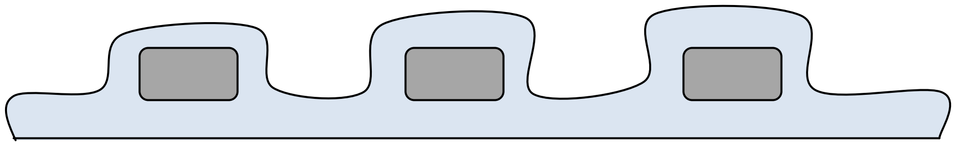

Figure 2.20 Topham, S., (2008) *Cross-section of Core-formed visualisation* [Illustration] *in* Aesthetic Log (AL2:17)

Furthermore, through my research I found that the problems of core material, glass type, forming, annealing, and decoration that existed in ancient times were very similar to those that needed to be addressed in the present research study.

***Core Material* –** Archaeologists and glass historians agree (Cummings, 2002:26) that the first stage of the core-forming process was to model by hand a core of friable substance around a metal rod. Originally the **core material** was thought to be composed of sand, hence the alternative term of **sand core technique** (Harden, 1956:16). In my research I found that this term was abandoned when Bimson and

Werner (1969:121) examined cores from 62 objects and described the composition as being 'a flaky mass of dark brown material through which were scattered white siliceous skeletal remains of seeds and small fragments of leaves... thus indicating large amounts of organic matter'. Wosinski and Brill (1968:123) support Bimson and Werner in that the core was not made of sand and suggest that this mixture could in fact be animal dung. The choice of core material would have been made on the basis of properties which benefited the making process. Therefore to decide upon the choice of core material, an understanding of these properties was required before I could establish whether they were significant to this research study.

One property would be for the core material not to adhere to the glass during the making process. Alternatively if the core material did adhere to the glass, then its **coefficient of expansion** (COE), would need to be the same as the glass, otherwise cracking would occur when the vessel cooled. The archaeological studies of Schuler (1962:32) identified cracking on the internal glass surfaces of samples, suggesting that adherence had taken place and that the coefficient of expansion of both materials did not match. However, Nicholson (Nicholson and Shaw, 2000:3) examined another set of samples and found no evidence of internal cracking, leading to the conclusion that organic-rich core material did not adhere to the glass or that its coefficient of expansion was the same as that of the glass. This research study would involve cores with a far greater complexity than a single vessel, therefore I decided to choose a material that did not stick to the glass, and in doing so remove the issues of incompatibility with regard to differing rates of coefficient of expansion (AL2:18).

Another property would be for the core material to hold its shape throughout the making process. The preferred shape for this research study was one which had a thin rectangular section, enabling it to be applied in strips on the flat surface of the glass (AL2:19). The ability of the core material to hold its shape depends on the structure of the material itself and the **binder** that holds it together. I found that there was no archaeological evidence to indicate the chemical composition of this binder, but Grose (1989:31) suggests that it would probably have been organic in makeup. During the firing process the binder burns away, creating gases which can stain the inside of the glass. During this research, I found a vessel (Figure 2.21) which had been damaged, exposing the inner surface which showed **inner staining**. On examination of the specimen I first thought that the inside had not been cleaned properly, but on closer inspection it became evident that the colouration was part of the inner glaze. However, it was impossible to determine whether this staining was a result of core material adhering to the glass or from binder staining (AL2:20).

Figure 2.21 *Alabastron*, c. 300 BC – c. 25 BC, height 9.8 cm [Core-formed Glass] [17]

Whilst this internal staining would not have caused a problem for the ancient glassmakers since opaque glass was used throughout the entire history of core forming (Cummings, 2002:52), it did pose a threat to this research study because of

[17] Registration number: 1894, 1101.163 (image © The Trustees of the British Museum).

the transparency of the glass. Therefore it was important that the binder chosen did not stain the inside of the glass.

The combination of core material structure and binder influences the ease with which it can be removed at the end of the process without causing damage to the vessel. I found that in narrow-necked vessels it frequently proved impossible to completely remove the core from under the shoulders of the vessel, resulting in a more opaque appearance than might have be expected (Nicholson and Shaw, 2000:4). It was essential to this research study that when the binder had burnt away, it was possible to remove the core material structure without leaving any traces of residue.

Two manufacturers were contacted for their advice and I conducted experiments on six possible core material samples[18] to assess their properties in terms of non-adherence, staining, ability to hold form and ease of removal after firing. All samples were composed of aluminosilicate fibres with an acrylic binder because of their excellent non-adherence properties to glass, and came in sheet form of thicknesses ranging from 3 mm to 6 mm. Test pieces were made up for each sample by placing the sheets between two layers of glass. These were then fired in the kiln to a temperature of 800ºC and allowed to cool. One sample[19] proved too difficult to remove and stained the inside of the glass. Three of the products[20] left a significant woven texture on the inside of the glass which would have obscured any inclusion within the void. The Fiberfrax **Ceramic Fiber Paper** and the Fiberfrax **Duraboard** left no staining, held their form well, were relatively easy to remove, and left only

[18] Unifrax products were Fiberfrax Ceramic Fiber Paper; Fiberfrax Duraboard; Isofrax Paper; and Insulfrax Paper. Thermal Ceramics products were Kaowool 1206 Paper and Kaowool 607 Paper.
[19] Insulfrax Paper.
[20] Isofrax Paper, Kaowool 1206 Paper and Kaowool 607 Paper.

slight traces of texture inside the glass. It was more economical to buy the Fiberfrax Ceramic Fiber Paper by the roll than to purchase flat boards of Duraboard so the former was chosen for the basis of the research, with a standard thickness of 5 mm (AL2:21).

***Glass Type* –** The second choice the ancient glassmakers would have made was that of **glass type**. Reference has already been made to the fact that **glass recipes** were included in the cuneiform tablets and that the glass used to form the core-formed vessels was opaque. Present-day glass recipes are determined by the **glass forming** process. In this research study that process was fusing and slumping, which required the essential property of maximum transparency. Five manufactures were contacted for samples and data specification sheets. Five types of fusing glass were tested to establish which gave the greatest clarity after fusing by placing the core material between two layers of glass and firing them according to the manufacturers' **firing schedules**[21].

Aesthetic Log (AL2:22):

> *Desag Artista completely clear with no imperfections within the glass. Baoli, green tint around the edges of the voided forms. Bullseye, Uroboros and Spectrum good degree of clarity but no data...*

Schott of Germany (**Artista Glass**) were most helpful in supplying extremely detailed information which I felt was a necessity should any **chemical**, **physical** or **thermal** property needed to be tested. Furthermore, the Schott glass was the only **fusible glass** suitable for larger sizes of glass (Schott, 2010:2) and detailed **architectural**

[21] Desag Artista made by Schott of Germany, Firing Schedule Appendix 3.
Tekta Crystal Clear made by Bullseye of USA, Firing Schedule Appendix 4.
Clear made by Uroboros of the USA, Firing Schedule Appendix 5.
Clear Spectrum 96 made by Spectrum of USA, Firing Schedule Appendix 6.
Clear Baoli glass made in China, Firing Schedule Appendix 7.

specifications, both being a necessity should the research application progress into **architectural glass**. The German manufacturing location of Schott also made it more cost effective and easier to obtain than glass from America and China.

Glass Forming **–** Glass forming would have been another consideration of the ancient glass makers. As stated previously, this research found no documented evidence as to the nature of this process. Whilst at first I thought that the glass forming process had no relevance to this research, I did however discover an interesting insight. The type of glass-forming process performed in a kiln depends upon the temperature to which it is heated (Figure 2.27). This research study focuses around the temperature ranges from 500ºC to 800ºC, as indicated by the red arrows in Figure 2.22.

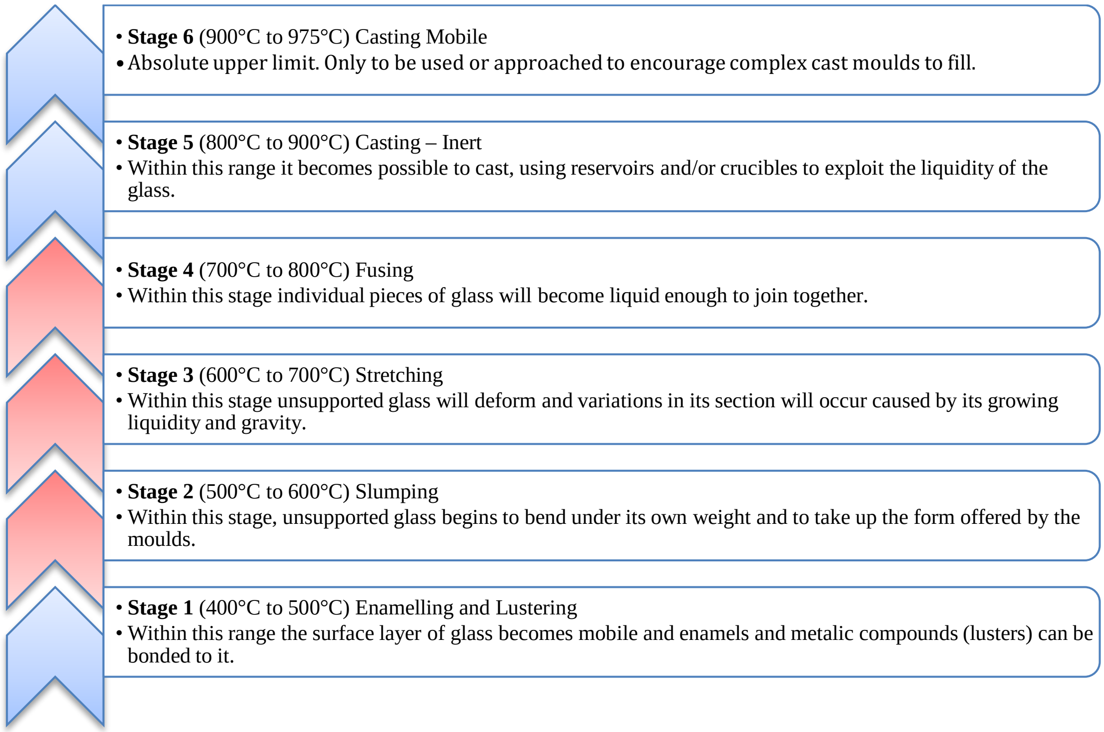

Figure 2.22 Cummings, K., (1997) *Kiln Forming* Heat Range [Table] *in* Cummings, K., (1997:47)

Figure 2.23 shows the technique for making core-formed vessels most favoured by glass practitioners and archaeologists based on the research of Stern and Schlick-Nolte (Nicholson and Shaw 2000:203).

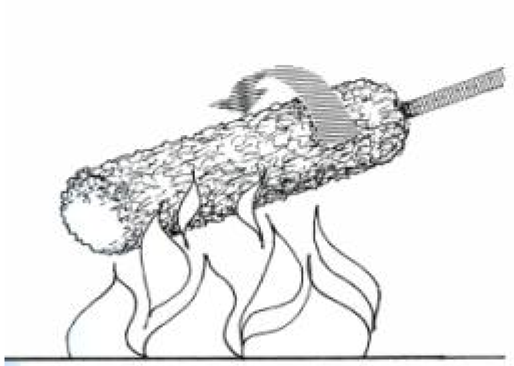

Figure 2.23 Cummings, K., (2002) *Crushed Glass Method* [Illustration] Cummings, K., (2002:53)

In this process the core is pre-heated and then rolled in powered glass. The core is reheated to fuse the glass and the process repeated until several layers are built up. This technique involves fusing bits of glass together, which is a similar concept as that used in this research, except on a much larger scale for the latter (AL2:23).

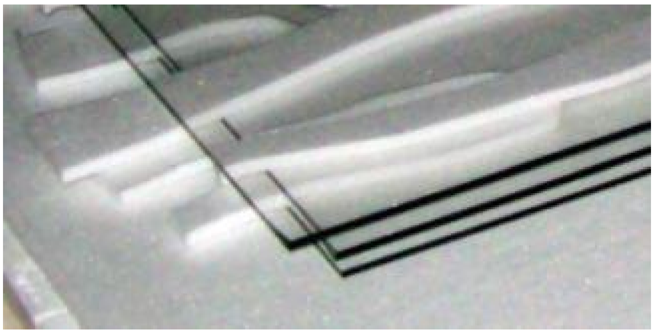

Figure 2.24 Topham, S., (2007) *Combining Void Strips with Glass* [Glass and Fibreboard] *in* Aesthetic Log (AL2:23)

Figure 2.24 shows strips of core material inserted between three layers of glass, which are then heated. Once cooled the core material is then removed, leaving a voided structure as shown in Figure 2.25.

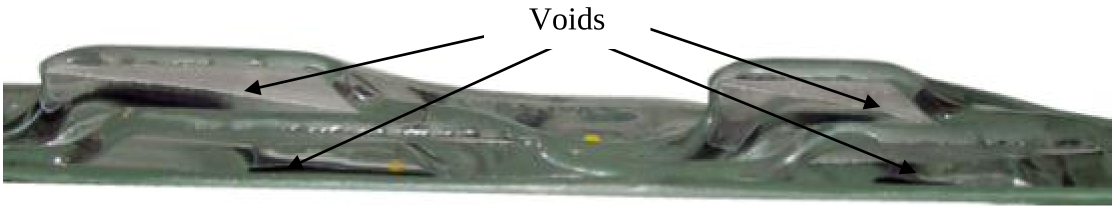

Figure 2.25 Topham, S., (2007) *Voided Glass Structure, End View* [Voided Glass] *in* Aesthetic Log (AL2:24)

An entry in the Aesthetic Log (AL2:24) describes Figure 2.25 as follows:

> *From the side I see four internal voids and how their form clearly affects the outside contour of the top surface. I see further complexity in that the inside of void on the bottom layer affected its outer profile which in turn affected the outer profile of the inside of the void on the top layer which in turn affected the outer contour of the top surface. It is easier to describe the voids in terms of being and non-being rather than inside or outside for example, it is the non-being (both layers of voids) which determine the being (contour) of the top surface. I can see several faults in the structure of the glass associated with weak web sections and poorly defined edges. This is not going to be easy it will require a lot of experimentation to get it right which needs to be translated into a set of principles that I can use within my practice.*

This Aesthetic Log entry indicates that there was a need to fully understand the relationship between the positioning of the core material and the firing schedule of the kiln. Failure to fully understand this relationship would probably result in wastage of glass, and at the very least experiments that could not be replicated. An entry into the Aesthetic Log (AL2:25) relating to the aerial view of Figure 2.25 (Figure 2.26) identifies three main variables associated with the glass voids:

> *Void form, because I can have organic, geometrical, figurative or non-figurative shapes with various depth and width. Void spacing, because I can have varying amounts of space between voids. Void layering, because I can have voids positioned in the top layer relative to voids in the bottom layer.*

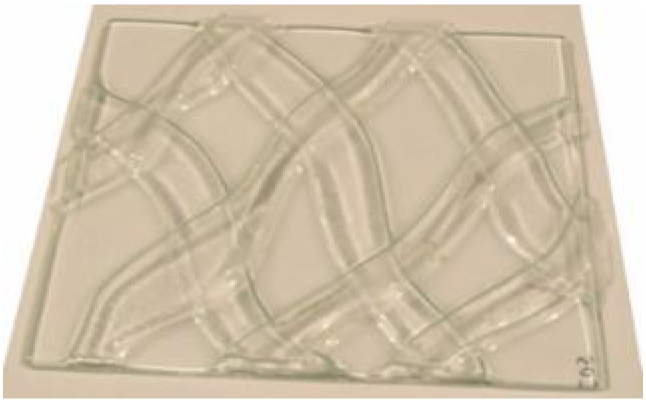

Figure 2.26 Topham, S., (2007) *Voided Glass Structure, Aerial View* [Voided Glass] *in* Aesthetic Log (AL2:25)

Therefore the glass-forming process would be centred on creating combinations of **void forms**, **void spacing** and **void layering** using a fusing and slumping process.

***Glass Annealing* –** The temperature and rate at which glass is heated and **annealed** (cooled) needs to be accurately controlled, otherwise stresses will build up in the glass and it will fracture. Whilst it is known that the Egyptians must have mastered this technique, there is no evidence to suggest how they did it. The fusing and slumping of glass within a kiln today is tightly controlled by programming a **kiln controller** with a firing schedule which results in a **temperature curve**. This research found that different types of glass have different temperature curves depending upon their thermal properties, such Coefficient of Expansion (COE). Furthermore, I found that thickness and surface area of the glass also determines the firing schedule in association with the particular characteristics of the kiln. Figure 2.27 shows a typical firing schedule for the fusing of Artista glass (COE 94) with a thickness of approximately 7 mm and a surface area not exceeding 750 cm^2 (Schott, 2008:4).

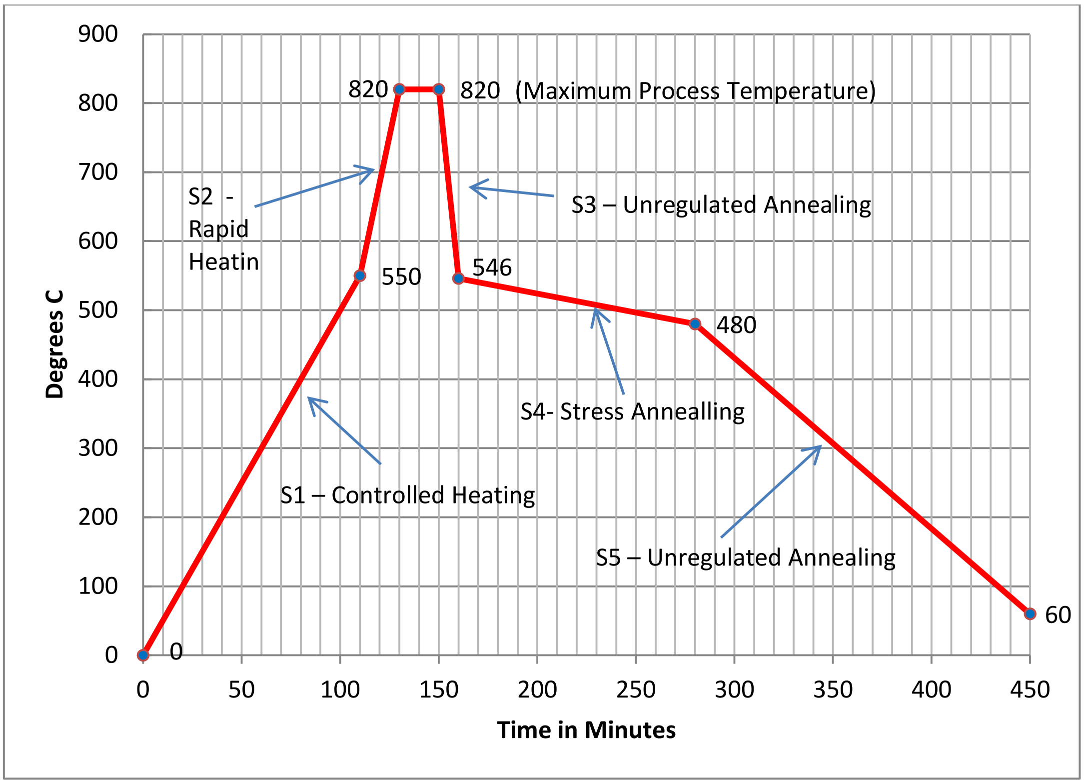

Figure 2.27 Schott AG, (2008) *Typical Firing Schedule for Fusing Artista Glass* [Chart] *in* (Schott AG, 2008:4)

The temperature curve can be divided into five segments. Segment 1 is the controlled heating phase from room temperature up to 9°C above the upper annealing point (541°C) at 550 °C. If the glass is heated too quickly during this phase it will fracture due to **thermal shock**. The larger the glass artwork the more slowly it needs to be heated. Segment 2 is the rapid heating phase where the glass can be heated up to the intended **maximum process temperature** (820°C) as quickly as possible without fear of fracturing and held for a period of time (minutes). The rise in temperature per segment is determined by a **ramp rate,** which is specified in °C per hour according to data sheets supplied by the manufacturer. Segment 3 is the beginning of the **annealing phase** and begins with a rapid unregulated temperature drop to 5°C above the upper annealing temperature at 546°C. If the drop ramp temperature is too slow at this point, **devitrification** will occur, a process which turns the glass cloudy. Segment

4 is the stress annealing phase down to the lower strain point (480°C), which must be tightly controlled otherwise **stress** will cause the glass to break either whilst within the kiln or once it has be removed. Segment 5 is the start of the **unregulated annealing,** which commences below the **lower annealing point** of the glass until the glass reaches room temperature.

Aesthetic Log entry AL2:26 refer to the anticipated problems associated with the firing schedule:

> *Thinking about the firing schedule which is critical to my research, there are three problems. The first is that there are no firing schedules for Fiberfrax, which is an insulator of heat, enclosed within glass. The second is that I do not know how the combinations of void shape, spacing and layering will affect the firing schedule. Thirdly, the process that I am trying to achieve is a single firing process whereas fusing and slumping is usually a two stage process.*

This research found that there were no documented firing schedules which allow for the inclusion of refractory core material within fused or slumped glass. I anticipated problems in adding significant amounts of core material due to its insulation properties. These would give rise to problems of heat distribution and release within the glass. Failure to identify the correct firing schedule would be detrimental to the outcomes of the research, ranging from issues with the voided forms to complete failure due to glass stress fractures whilst inside or outside of the kiln.

The traditional technique of fusing and slumping usually requires two firing processes. The first is to fuse the glass using stage 4 detailed in Figure 2.32 (temperature around 800°C), allowing it to cool, and then as a second process to slump the glass over a mould using stage 2 (temperature between 500 to 600°C) to create the form. This research requires the insertion of refractory core material between the sheet glass layers to be fused and slumped simultaneously. Reflecting on the anticipated problems increased my anxiety of the making process, at which point I realised there was another issue.

Aesthetic Log (AL2:27):

> *I foresee another problem. Slumping glass at high temperatures alters the viscosity of the glass causing it to flow more freely due to gravity. What does this mean for the rise and falls of the void forms – glass too thin on the top?*

Glass Decoration – The final choice for the ancient glassmakers would have been about the aesthetic qualities of **glass decoration**. The research conducted found a consensus amongst glass practitioners and archaeologists (Cummings, 2002:54) as to the method of decoration. The outer surface was smoothed on a flat stone slab and coloured trails of thin glass added and pressed into the surface. There is also a variation of this technique, whereby the trails were **combed** to create zigzag patterns, a design particularly common in Egypt (Chown, 1988:50). The decoration stage in this research study, apart from the contour of the top surface of the glass, comes from coloured insertions within the glass voids.

Summary: Chapter Two

To summarise, this chapter has brought together historical ideas of trapunto and the core forming process, and combined them with the phenomenology of being and non-being, to produce ideas about a glass voided form that would allow recycled inclusions to be inserted within it. I discovered that certain problems in ancient times would have needed to be resolved, and which acted as a starting point for the technical development of my work. By examining Florentine trapunto in terms of being and non-being, I identified a set of inclusion and glass parameters that expanded the conceptual map for the aesthetic qualities of my work. The parameters identified for glass were (1) void forms, (2) void spacing, and (3) void layering, and for inclusions were (1) type, (2) size, and (3) manipulation, as shown in Figure 2.28.

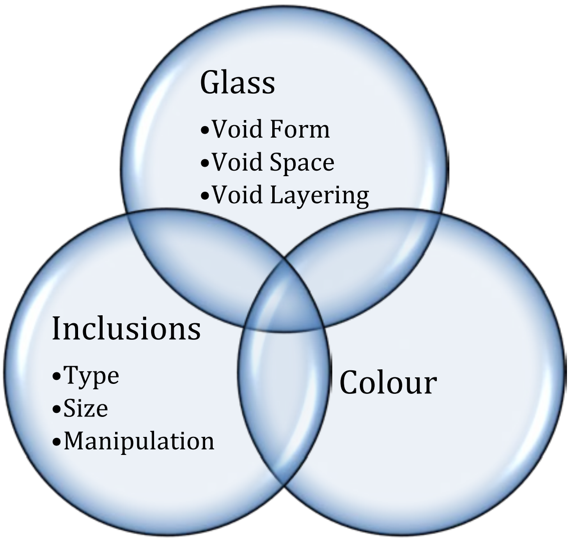

Figure 2.28 Topham, S., (2013) Expanded Conceptual Map [Diagram]

I discovered that the being and non-being of the void form was critical because it determined the outside profile of the glass and the internal void into which inclusions could be placed. The inclusion type, size and means of manipulation were all limited by the physical dimensions of the internal void. The void space would be determined by the inclusion type used for the background, the size of its structure or weave and the way it was manipulated either in or under the void space. Finally, the void layering would allow for variances between the inclusion type, size and method of manipulation.

The findings of this chapter confirmed that the practice-led element of this research would be based on a combination of technical development and aesthetic judgement.

Chapter Three

Aesthetic Qualities and Colour

Conceptual Map and Matrix

Inserting coloured recycled inclusions into the voids of Figure 2.26 transforms it into a **vibrant** piece of artwork (Figure 3.1).

Figure 3.1 Topham, S., (2007) *Voided Glass Structure with Inclusions* [Glass and Recycled Inclusions] *in* Aesthetic Log (AL3:1)

An entry made in the Aesthetic Log (AL3:1) indicates the significance of colour to the research:

> *The colour makes the void forms, spacing and layering more visible. I see two compositions, one caused by the colour within the voids and the other by the void forms themselves. I see many colour contrasts within each void, across each layer of voids and between the upper and lower void layers. The colour varies as a result of the inclusion type and its texture. I particularly like the way the different sized inclusions are fragmented and juxtaposed – pointillism comes to mind. At a distance the fragments merge into a whole and the texture is lost. The folds and creases create a visual effect that would be impossible to paint. The glossiness of the glass surface makes the colours seem more vivid than they really are. I see reflections and shadows caused by the void forms which cause slight variations in colour and sparkle. Overall the piece looks bright, clean and crisp.*

It highlights the general components of colour that are seen in the research, namely (1) colour contrast, (2) colour composition, and (3) colour optics. These components further complete the conceptual map for aesthetic qualities (Figure 3.2).

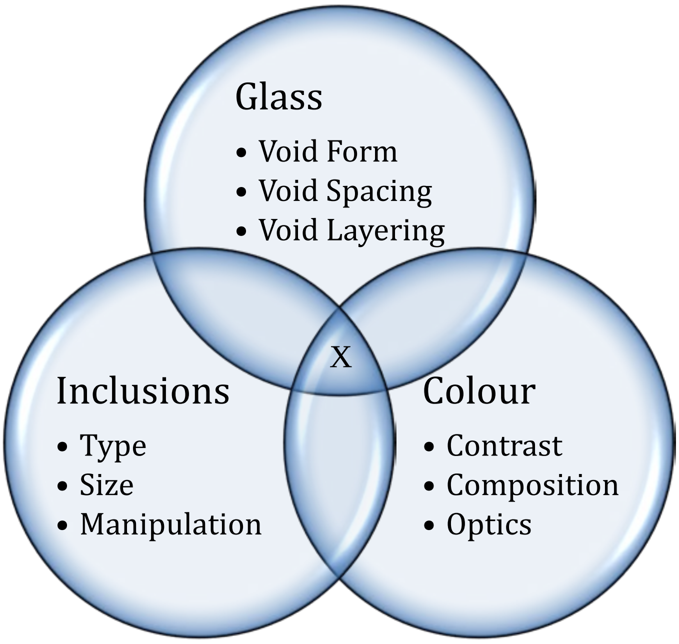

Figure 3.2 Topham, S., (2013) Complete Conceptual Map with Components [Diagram]

Whilst the intersection between each two circles can be said to indicate a specific aesthetic quality, for example colour/contrast and inclusion/type, it is the intersection of all three circles indicated by 'X' which will give the unique aesthetic qualities of the experiments presented in this research study. The three components and their subdivisions form a matrix (Figure 3.3), which illustrates the significance of colour to the whole research project.

The matrix shows 27 possible combinations of 'X', for example number 14 shows aesthetic qualities based on the combination of colour/composition, inclusion/size and glass/void spacing.

	Inclusion Type	Inclusion Size	Inclusion Manipulation	Colour
Glass Void Form	**1**	**2**	**3**	Contrast
	4	**5**	**6**	Composition
	7	**8**	**9**	Optics
Glass Void Spacing	**10**	**11**	**12**	Contrast
	13	**14**	**15**	Composition
	16	**17**	**18**	Optics
Glass Void Layering	**19**	**20**	**21**	Contrast
	22	**23**	**24**	Composition
	25	**26**	**27**	Optics

Figure 3.3 Topham, S., (2013) Matrix Showing Combinations of Aesthetic Qualities [Table]

This matrix represents a pathway to understanding the aesthetic qualities and colour theory of the experiments detailed in this research study. The matrix shows that colour can be divided into three sets of nine combinations, namely: colour contrast, colour composition and colour optics, each associated with: inclusion type, inclusion size and inclusion manipulation. Finally, each combination is completed by adding: glass void form, void spacing or void layering.

Colour Theory

I began my literature review into colour theory by reading the books *Colour and Culture: Practice and Meaning from Antiquity to Abstraction* (Gage, 1993), *Colour and Meaning Art, Science and Symbolism* (Gage, 1999) and *Colour Ordered: A Survey of Colour Order Systems from Antiquity to the Present* (Kuehni and Schwarz, 2009), and discovered the enormity of the field of colour. I found that much had been written on colour and many inconsistencies in the language had emerged as a result of the passage of time, different perspectives (ranging from physics to chemistry, physiology, psychology and art), and probably errors in translation (mainly from

German to English). Therefore in an attempt to resolve the differences in language I decided to trace elements of colour theory back to their original source. My literature review identified four distinct periods that were relevant to this research study. The first period (1–1300 AD) concerns mosaics and stained glass. The second period (1600–1900 AD) concerns the formulation of colour theories by people such as Newton and Goethe. The third period (1900–2000 AD) was the **Bauhaus** teachings of colour by Itten, Albers, Kandinsky and Klee. The fourth period was the current usage of computer-based applications for gallery retrieval systems.

Colour Contrast

Contrast is the comparison of colour and therefore implies that order exists and is quantifiable using some dimensional scale. Adolf Hoelzel (1919:17) identified seven types of contrast which were later adapted by Itten (1961/1973:36). Figure 3.4 shows a table identifying the comparison between the two sets of contrasts.

Hoelzel's Contrasts	Itten's Contrasts
Hue	Hue
Light-Dark	Light-Dark
Cold-Warm	Cold-Warm
Complementary	Complementary
Much-Little	Extension
Gloss-Mat	Saturation
Colour-Achromatic	Simultaneous

Figure 3.4 Topham, S., (2013) Hoelzel and Itten Contrasts [Table]

The table in Figure 3.4 shows agreement between both authorities for the first four contrasts, with both choosing to name the contrasts differently for the remainder. An entry into the Aesthetic Log (AL3:2) referring to the sample shown in Figure 3.1 identifies some specific types of contrasts:

I see contrasts of hue, colours which are analogous (various yellows) and complementary contrast (yellow against violet). I see light and dark contrasts between the layers and within each void. I see the warm colours of yellow advancing and contrasted with the cold violet receding I know there to be contrasts in saturation as some of the inclusions were dyed by me. I like the way that the small quantity of yellow material in the central void immediately draws the eye.

This log entry identifies six dimensions of contrast: **hue**, **light/dark, saturation**, **cold/warm, extension** and **complementary,** which are ways of describing colour.

***Contrast of Hue* –** The term *hue* relates to terms such as red, blue or yellow and has no other colour dimension. Sir Isaac Newton's (1704) published work *Opticks: Or, A treatise of the Reflections, Refractions, Inflexions and Colours of Light* is probably responsible for the establishment of a science-based colour theory, resulting in an order of hue. Newton found that if white light is passed through a glass prism, refraction produced a visible series of hues to be dispersed, namely red, orange, yellow, green, blue, indigo and violet. Newton then arranged the seven hues into a circle where the size of each segment differed according to its range of **frequency** (Figure 3.5).

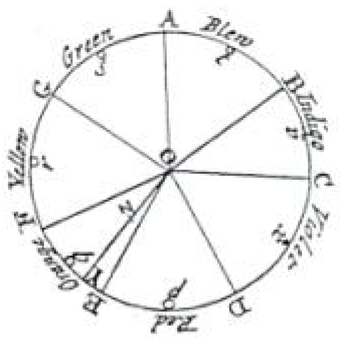

Figure 3.5 Newton, I., (1704) Colour[22] Circle [Illustration] *in* Newton, (1704:114)

Newton (1704:114) suggests that the seven segments of the circle were based on an analogy of the seven notes of the diatonic musical scale, a relationship often quoted

[22] Newton did not differentiate between the terms colour and hue.

by theorists of this and later periods in history. Newton's experiments led to the development of other colour theories based on paint mixtures and geometrical and mathematical relationships. Colour theories are communicated by printing them on paper and therefore can be used for visual comparison purposes irrespective of the originating techniques or materials.

In terms of colour theory, it is usual to present the relationships of hues in circular form[23] and to refer to this order as a **hue circle**. In the teaching of art this hue circle is normally based on the work of Itten (Figure 3.6). The method of constructing the colour relationships around the circumference of the circle is critical as it determines the hue spacing and subsequently the measure used for hue contrast. Itten (1961/1973:34) created his colour relationships using paint pigments and the principles of geometry by placing the three **primary hues** of yellow, red and blue in an **equilateral triangle** and constructing a circle around them.

Figure 3.6 Itten, J., (1961) *The 12 Hue Circle* [Illustration] *in* Itten, (1961/1973:35)

The points of the triangle placed the three primary hues at equal distances around the circumference of the circle. A hexagon is then created within the circle to form three

[23] Linear, triangular and overlapping circles formats were also used (Kuehni and Schwarz, 2009).

isosceles triangles with their points representing **secondary hues**. A second outer circle is constructed and divided into 12 equal segments into which the three primary and three secondary hues are placed. In the remaining blank sectors, Itten created the six **tertiary hues** by mixing a primary with a secondary hue.

Itten (1961/1973:36) describes the effect of hue contrast when he writes ‘the effect is always tonic, vigorous and decided’. To create this effect, at least three clearly differentiated hues are required, for example yellow/red/blue; red/blue/green; blue/yellow/violet; yellow/green/violet/red; violet/green/blue/orange/black. The **triad** of primaries yellow/red/blue (Figure 3.7) represents the greatest contrast of hue (AL3:3). The intensity of contrast of hue diminishes with secondary hues and is even less distinct when tertiary colours are used.

Figure 3.7 Vasiljeva, I., (2013) Hue Contrast [Textile]
Vasiljeva, (2013, [Online])

Aesthetic Log entry AL3:4 suggests the relationships between hue contrast and matrix position:

> *I can see how the matrix positions relate to hue contrast. If the hue contrast combines with the inclusion type within voided form, space or layer, combinations 1, 10 and 19 could be affected.*

Light/Dark Contrast – The continuum of light/dark contrast is also referred to as **value**, **brightness, tint** or **shade** in the language of colour. The addition of white to a hue increases its lightness, value, brightness or tint. The addition of black increases its darkness and shade and decreases its value. Light/dark contrast represents the difference between two points on this continuum. Light/dark contrast was central to the published work of Johann Wolfgang Von Goethe in 1810, *Zur Farbenlehre* (*Theory of Colours).* Goethe (1810/1970:lvi) indicates 'that light and darkness, brightness and obscurity, or if a more general expression is preferred, light and its absence, are necessary to the production of colour'. Goethe placed human vision at the centre of his colour theory and by doing so related physiological and psychological factors to colour, whereas Newton had in the main specified the physical. The year 1810 was also when Runge (1810) released his work *Farben-Kugel* (*Colour Sphere*), which is arguably the ancestor of most modern systems of surface colour. The **colour sphere** produced by Runge (Figure 3.8) was significant because it represented a three dimensional **colour space**. The sphere based on the 12-segment equal spaced hue circle construction located on the equator of the globe[24] has two poles, north and south, representing white and black.

[24] Runge uses the words *sphere* and *globe* synonymously.

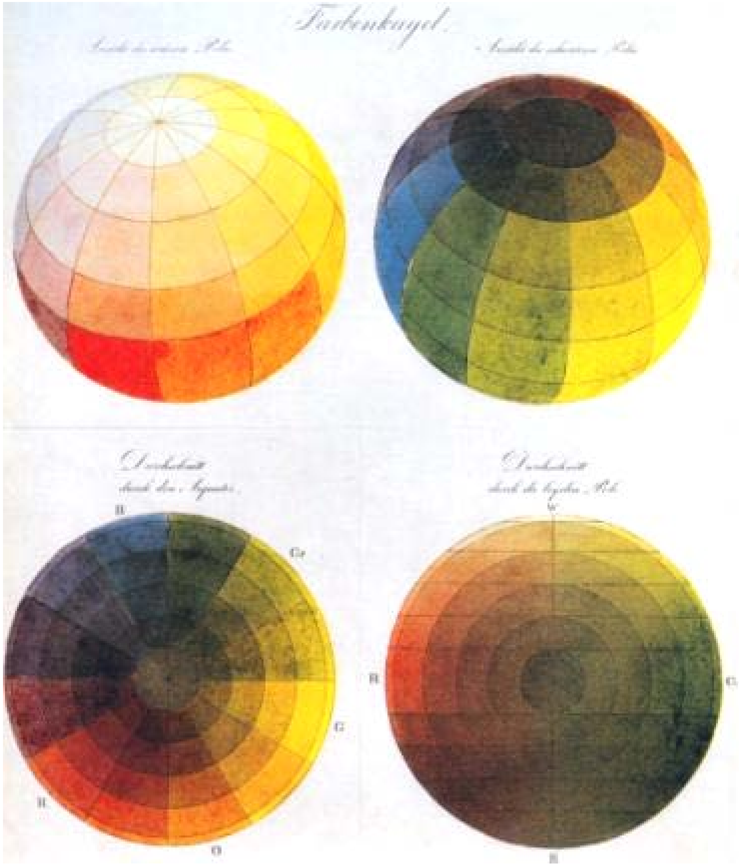

Figure 3.8 Philipp Otto Runge (1810) *Colour Sphere* [Illustration] *in* Runge and Steffens, (1810:16)

Runge's sphere gives five colour variations. Movement towards the left or right result in a different hue; movement upwards makes a particular colour lighter and downwards darker; movement inwards towards its **diametrically opposed hue** results in grey[25] at the centre of the sphere.

[25] The mixing of two opposing paint colours on a hue circle will result in grey (see Klee 1956/1961: 475).

The work of Seychellois artist Michael Adams MBE (Figure 3.9) shows a black and white drawing comprising of positive and negative spaces developed for the production of **silk screens** prior to colour printing (AL3:5).

Figure 3.9 Adams, M., (1981) *Untitled* [Drawing] *in* Author's Own Collection

In my interview on 3rd June 2008 with Michael Adams he said (AL3:6):

> *There was a little story that I quite liked. Bertrand Russell[26] told a story. He asked a child who had done a painting, how do you paint what do you do? The child replied I have a think and then I put a line around my think. And that was his explanation about how he painted. Cezanne[27] also said the white on a canvas is probably the most important colour in your whole thing so be careful how you treat it.*

Aesthetic Log entry AL3:7 shows the significance of this to my practice:

> *Russell and Adams have meaning for my practice. I see glass void forms of the sample have outer edges that create distinct lines – a repository for my thinking. They also separate the different types of inclusions from the most important white background space. I can see how this aspect of light/dark contrast has potential to affect the combinations 1 and 10 of the matrix in terms of inclusion type, glass voided form and the spacing between the void forms. The white space of the background must be treated with equality within my artwork.*

[26] The origins of this story date back to the work of Roger Fry (1920:63).
[27] No reference to Cezanne actually saying these words could be found but it is documented that Cezanne considered white space left on the canvas to be most important (Fry, 1927:77).

Light/dark contrast can also relate colours to one another and create **planes** within an artwork. The work of Hawaiian artist James Coleman (Figure 3.10) exemplifies this effect, where the contrast of light/dark creates a foreground and background. It also shows that each plane has minor light/dark contrasts but not so much as to confuse the distinction between the two main groupings (AL3:8).

Figure 3.10 Coleman, J., (no date) *Peaceful Seclusion* [Oil on Canvas] *in* Author's Own Collection

In terms of the sample (Figure 3.1), Aesthetic Log entry AL3:9 suggests how the light/dark contrast relates to plane and **texture**:

> *There is a light/dark contrast between upper and lower layer voids. The colour combines with the glass layers to make two separate planes. It is clear that texture affects the colour in my work but it is not on the surface as the glass is smooth. Inside there are nooks and crannies created by the manipulation of the inclusions. The walls of the voids force the inclusions to go a particular way. Each inclusion type has its own surface texture and the chopped size of the inclusions create a flaky textured effect.*

Light/dark contrast has potential to affect combinations 1, 2 and 3 (inclusion type, size and manipulation) within the voided form; combination 10, background inclusion type and colour of the void spacing compared to the inclusion type and colour within the void forms; combination 12, void space determines the width of the void form and therefore affects the way the inclusions can be manipulated; combinations 19 and 21 where separate layers form light/dark planes within the artwork as a result of inclusion type or manipulation (AL3:10).

Contrast of Saturation **–** Only Itten (1961/1973:96) included saturation as a contrast in the table shown in Figure 3.4, and defined it as the degree of **colour purity** measured by the hue's **intensity** from the colour grey. The measurement of grey is also referred to as **tone.** The grey was a reference to the north and south poles by Itten of the colour sphere of Runge.

The work of A. H. Munsell published in 1905 and entitled *A Colour Notation* describes the components of his colour theory:

> It may sound strange to say that colour has three dimensions, but it is easily proved by the fact that each of them can be measured. Thus in the case of the boy's faded cap its redness or HUE is determined by one instrument; the amount of light in the red, which is its VALUE, is found by another instrument; while still a third instrument determines the purity or CHROMA of the red. (Munsell, 1905:13)

Munsell (1905:20) describes **chroma** as 'the quality by which we distinguish a strong colour from a weak one', and it is the preferred term for saturation in the colorant industries (Ingamells, 1993:141).

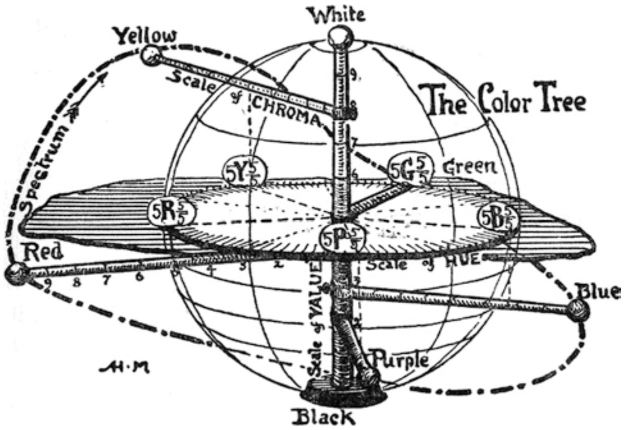

Figure 3.11 Munsell, A., (1905) *The Colour Tree* [Illustration] *in* Munsell, A. (1905:24)

Munsell’s colour theory (Figure 3.11) composed of a 10-segment hue circle with the vertical axis representing value, numbered from black (0) to white (10). Perpendicular to the vertical axis is a scale of chroma. Figure 3.12 shows how some chroma scales have more modulations than others.

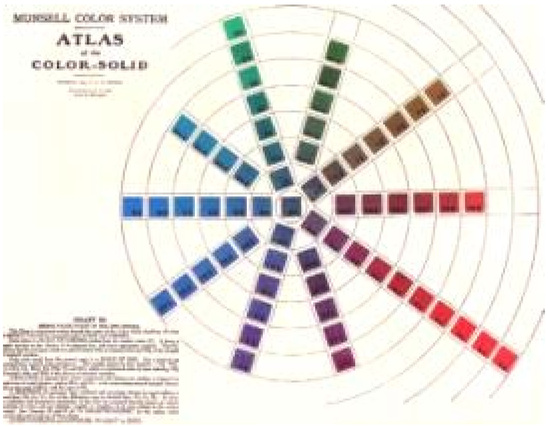

Figure 3.12 Munsell, A., (1907) *Chart 50 (value 5)* [Chart] *in*
Kuehni and Schwarz, (2009:114)

With regard to this, Munsell (1905:14) writes: ‘The fact that some colours exceed others to such an extent as to carry them out beyond the sphere is proved by measuring instruments’.

Itten (1961/1973:97) uses the term '**vivid**' to describe the effects of saturation contrast when he writes 'a colour may appear vivid beside a dull tone, and dull beside a more vivid tone'. The work of Michael Adams (Figure 3.13) demonstrates this effect with the vibrant colours of the bamboo canes contrasting with duller, diluted colours of the background (AL3:11). In the interview with Michael Adams he specifically mentioned the vibrancy of his work (AL3:12):

> *… but if you put Green next to Blue you get a vibrancy and if you put a Alizarin Crimson against Black then you have a vibrancy again and it is not dead, everything has to, everything is radiating and is in a state of flux.*

Figure 3.13 Adams, M., (2008) *Jardin Du Roi* [Watercolour] *in* Author's Own Collection

An entry into the Aesthetic Log (AL3:13) refers to my experimentation with the saturation of leaf green dye by various types of **silk fibres** and the resulting different levels of vibrancy as shown in Figure 3.14.

Figure 3.14 Topham, S., (2008) ***Inclusion Saturation*** **[Silk Fibres]** ***in*** **Aesthetic Log (AL3:13)**

Therefore saturation contrast has the potential to affect this research study where inclusion types of saturated colours are placed within a single voided form, across voided forms of the same layer or in different layers. These combinations represent 1 and 19 in the matrix showing combinations of aesthetic qualities as shown Figure 3.3 (AL3:14).

Cold Warm Contrast – Itten (1961/1973:64) describes the colours yellow, yellow/orange, orange, red/orange, red and red/violet as warm, and yellow/green, green, blue/green, blue, blue/violet and violet as cold. The metaphorical usage of the terms ‘cold’ and ‘warm’ dates back to the middle ages. Wierzbicka (1996:315) states that ‘red and yellow are thought of commonly as warm colours... Yellow because it is associated with the sun and red because it is associated with fire.’ English artist Charles Hayter in 1813 first placed the warm/cold relationship in a circular model (Figure 3.15) and described the effects: ‘the warm colours are adapted to advance, and the cold are considered as retiring colours’ (Hayter 1815:167).

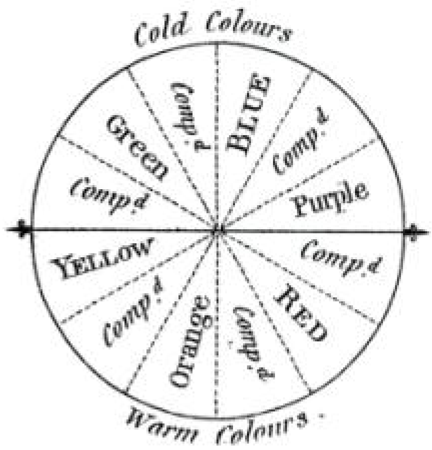

Figure 3.15 Hayter, C., *Painter's Compass* [Illustration] *in* Hayter, (1815:164)

Nick Maley, a Caribbean artist based in Antigua, worked in film before returning to fine art, the discipline he originally studied. Maley refers to the three dimensional qualities of film in connection with his painting: 'oh yes, the basics of colour and composition are all there, as is a concern to create a two dimensional object that represents a three dimensional world' (Maley, 2013 [Online]).

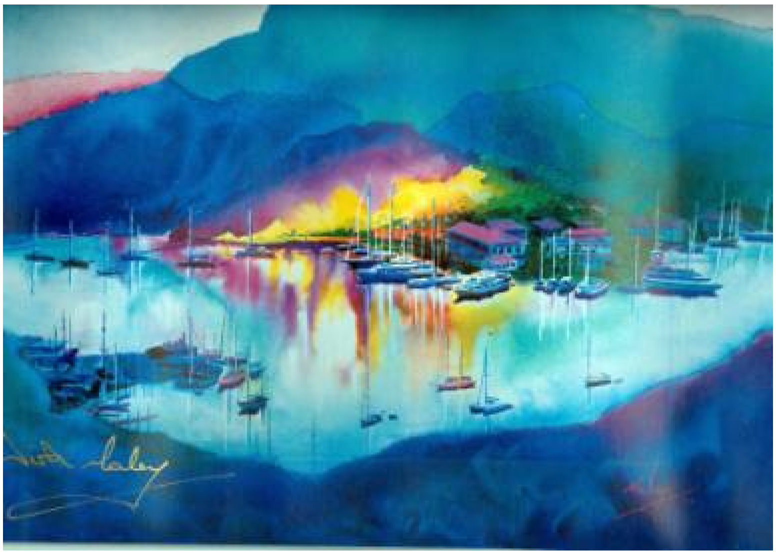

Figure 3.16 Maley, N., (1996) *Harbour Lights* [Watercolour] *in* Author's Own Collection

Harbour Lights by Maley (Figure 3.16) shows the cool/warm effect with the warm colour advancing and the cool colours receding into the background, giving a three-dimensional quality to the painting (AL3:15). Sundet (1978) proposes that the difference in perceived depth is due to the differences in **wavelength** of cooler and warmer colours and the inability of the eye to focus simultaneously on both.

The aesthetic quality of **depth** caused by the contrast between cold and warm colours has potential to affect combinations 3, 10 and 19 (AL3:16):

> *Cold/Warm contrast – inclusion type and colour within the voided layers have potential for enhancing depth, combination 3. Also the colours of the background void space and void layers, combinations 19 and 10 respectively.*

***Contrast of Extension* –** Contrast of extension (proportion or quantity) involves the contrast of two or more relative areas of colour in relation to their visual weight. The lighter the colour, the greater its impact, requiring less proportional area compared to darker colours in the composition. For example Itten (1961/1973:104)[28] used the following numerical light values, yellow 9 and violet 3 meaning that yellow is three times as strong as violet and therefore must occupy much less area than violet to create balance in a composition. Adams states that the more saturated the colour, the more powerful the effect (AL3:17):

> *You see, all colours are not even, some colours have the ability to stand out and sing loudly to you. Some people say that you should achieve balance in the painting but I tend to emphasis specific colours, it attracts people to my paintings.* (Adams, 2008 [Interview])

[28] Goethe (1810/1970:2-45) provided the foundation for the use of **numerical light values** of colour.

Figure 3.17 Adams, M., (1997) ***Botanical Gardens*** **[Watercolour]** ***in*** **Author's Own Collection**

Aesthetic Log entry AL3:18 refers to the small areas of vibrant reds in Adam's *Botanical Gardens* (Figure 3.17) representing a good example of the effects of contrast of extension. The sizes of the fragmented inclusions and their positioning within the voided form and layering have the potential for enhancing this effect. The void spacing also has the potential to enhance or reduce the contrast of extension by virtue of its area. Combinations of 2, 11 and 20 of the matrix represent these potentials (AL3:19).

Complementary Contrast – Newton's observation (number nine in *Opticks, Book Two, Part One*) was probably the first scientific theory to investigate complementary colours when he wrote:

> Comparing the coloured rings made by reflexion, with these made by transmission of the Light; I found that white was opposite to black, red to blue, yellow to violet, and green to a compound of red and violet. (Newton, 1704:14)

Newton found that when two transparent thin disks were pressed together, different colours appeared on either side of the combination and recorded this in a diagram (Figure 3.18).

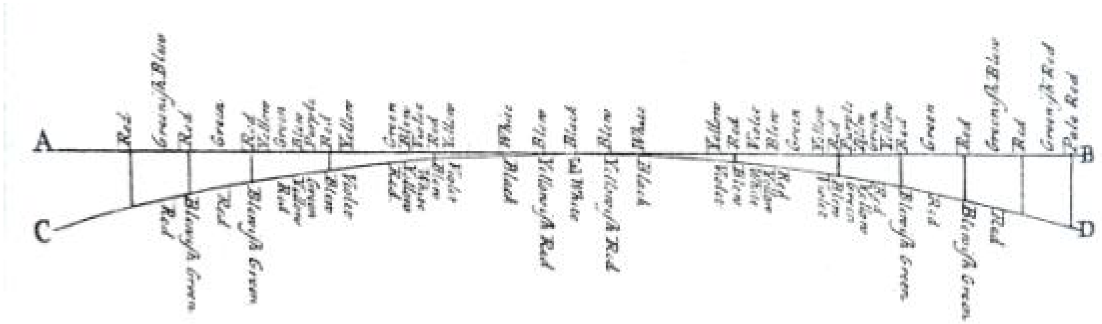

Figure 3.18 Newton. I., (1704) *Newton Rings* [Illustration] *in* Newton (1704:14)

Complementary contrast also refers to two diametrical opposites on a hue circle, for example yellow and violet, as shown in Itten's two-dimensional hue circle (Figure 3.6). In a three-dimensional model such as Runge's sphere (Figure 3.8), any diametrical opposite colour whose plane passes through the centre point and has the same intensity of chroma is also complementary.

Figure 3.19 Harrison, C., (2002) *Two Candles on the Mantelpiece* [Watercolour] *in* Author's Own Collection

The work of Claire Harrison (Figure 3.19) shows the decided effects of complementary contrast. Harrison refers to both the two and three dimensional usage of complementary colour around the sphere (AL3:20):

> *So pink looks fantastic with a bit of orange and a bit of mauve and then you whack in some complementary colours so if you're using red then it will be green. But instead of using green you would use a light version. So it works with any good colour combo. So you take a bit of yellow and add a bit of orange that looks a bit like red then you can have green that's a bit turquoise then you have a purple mauve. And that always gives you a good colour combo. Makes it really zingy.* (Harrison, 2009 [Interview])

When the complementary colours combine with the inclusion type within the voided form, space or layer, combinations 1, 10 and 19 in the matrix have the potential to enhance the aesthetic quality of complementary contrast (AL3:21).

Colour Composition

This section considers elements of colour composition that are significant to my research study, namely **Colour Harmony**, **Colour Direction** and **Simultaneous Pattern.**

***Colour Harmony* –** Judd and Wyszecki (Judd 1975:61) defined colour harmony thus: ‘when two or more colours seen in neighbouring areas produce a pleasing effect, they are said to produce a colour harmony’. Goethe (1810/1970:341) described colours as harmonious if they were located diametrically opposite (complementary) to each other on the hue circle. Ostwald (1916/1969:34) described colours as harmonious if they had equal white content, equal black content or equal hue content. Munsell (1905:29-37) described harmony only when colours are located on a specific path in his colour space, for example colours of the same hue and the same chroma or colours of the same value and the same chroma. Itten (1961/1973:118) suggests that several **geometrical relationships** within the hue circle develop harmonious compositional themes. Complementary hues (two hues that diametrically oppose each other) and **analogous** (three or more colours next to each other) have already been referred to under the section on contrast presented earlier in this chapter.

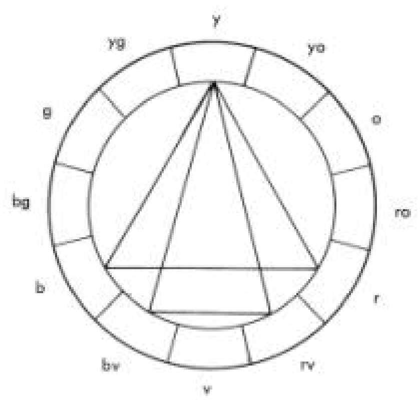

Figure 3.20 Itten, J., (1961) *Colour Harmony 1* [Illustration] *in* Itten, (1961/1973:118)

Figure 3.20 shows several harmonious relationships based on the geometrical form of the triangle. An equilateral triangle rotated will result in even spacing of the hue segments around the circle and will form a triad, for example the textile garment (Figure 3.7) based on the triad of yellow/red/blue. If only two of the triad colours are used, this is referred to as a **partial triad**. The second triangle in Figure 3.20 shows hues on either side of its complement (**split-complementary**).

Figure 3.21 shows colour relationships based on two **tetrads**. The first is a square in which two pairs of complementaries in the colour circle are perpendicular to each other. The second is a rectangle, giving another set of harmonious hues. Further harmonious relationships can be constructed based on hexagons (**hexads**) or just two adjacent colours in the hue circle (**dyads**).

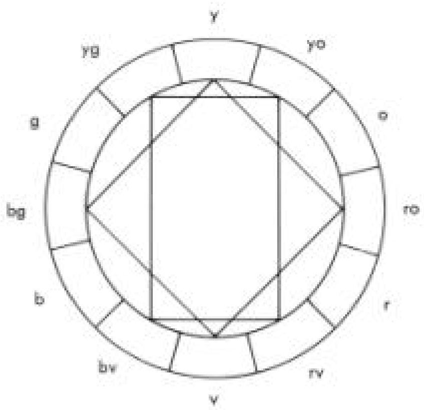

Figure 3.21 Itten, J., (1961) *Colour Harmony 2* [Illustration] *in* Itten, (1961/1973:118)

Itten (1961/1973:118) also suggests that these variations can be applied to his colour sphere with two tonal modulations that are symmetrical, for example a red value must correspond to the same green value on the opposing side of the sphere. However, as we have seen with the Munsell **colour tree** (Figure 3.12), the chroma dimension is not symmetrical and therefore the application to three-dimensional spheres is limited.

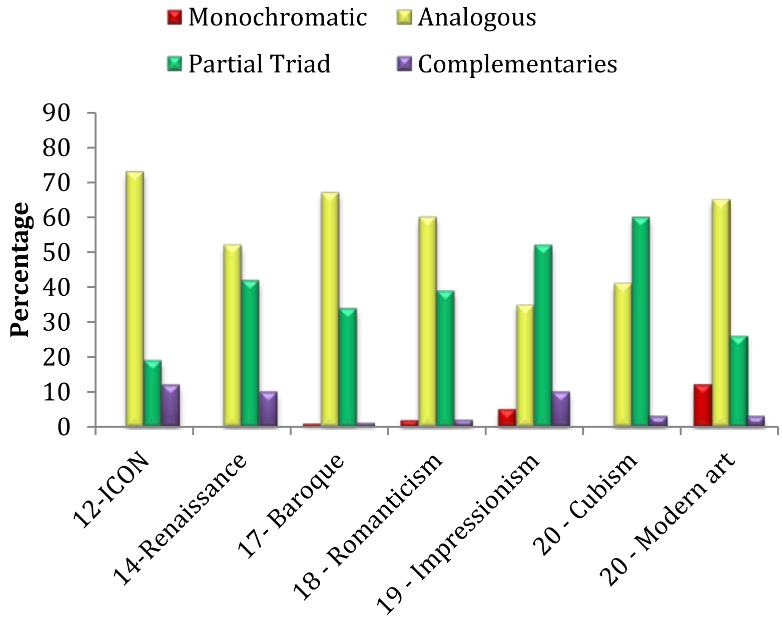

Figure 3.22 Ivanova, K., (2011) ***Percentage Use of Monochromatic, Analogous, Partial Triad and Complementary Colour Schemes According to Art Movement*** **[Graph]** ***in*** **Ivanova, (2011, [Online])**

Electronic gallery retrieval systems use these harmonic relationships, for example Ivanova (2011) used **colour analysis software** to retrieve 600 paintings from different movements and compare their colour harmonies (Figure 3.22). Of these 600 paintings, Ivanova identified 120 as **monochromatic** and the remainder as analogous, partial triad or complementary harmonies. The data shows that despite the considerable amount written about complementary harmony in colour theory, it is little used in practice, whilst the opposite is true of analogous and partial triad harmonies. Aesthetic Log entry AL3:22 suggests the relationships between colour harmony and matrix position:

> *I can see the potential for enhancing colour harmony by combining the inclusion type hue with void forms, layers or spacing. Coloured inclusions in single void forms or across the voids within a layer or between void layers also have the potential to produce colour harmonies. Furthermore, coloured glass could be used for background void spacing and the inclusion colours offer a greater potential for colour harmonies. These harmonies represent combinations 4, 13, and 22 in the matrix.*

Colour Direction – This concerns the juxtaposition of two or more colours in such a way as to jointly produce a distinct aesthetic quality. Itten (1961/1973:144) identified five main directional colour configurations: (1) vertical, (2) horizontal, (3) vertical horizontal combined, (4) diagonal, and (5) circular. *Vertical* denotes the aesthetic qualities of lightness, height and depth as shown in the work of Carole Waller (Figure 3.23). The principal grey forms and the pale coloured backgrounds are vertically parallel, giving the aesthetic qualities of lightness and height (AL3:23). Waller's work is interesting because it comprises of two layers of hand-painted silk with equal spacing in between, which enhances the illusion of depth. In an interview (AL3:24), Waller (2009) stated, *'Depth is important to my work it can be achieved in many ways but I prefer to use the transparency of the material and physical gaps between layers to produce it.'*

Figure 3.23 Waller, C., (2001) *Shadowy Figure in Landscape* [Hand Painted Silk] *in* Exhibition Catalogue: Inspirations: The Textile Tradition Then and Now (2001:29)

Horizontal denotes the aesthetic qualities of weight, distance and breadth as shown in *Porthmeor Calm,* the work of Jane Reeves (Figure 3.24). *Porthmeor Calm* comprises of layers of coloured crushed glass (frit) placed on a glass surface and fired in a kiln. The dark blue enhances the weight of the artwork and the horizontal waves of colours enhance its breath. The progression from the sea to the horizon enhances the aesthetic quality of distance (AL3:25).

Figure 3.24 Reeves, J., (2010) *Porthmeor Calm*, [Fused Glass] *in* Reeves, (2011)

Itten states (1961/1973:146) that the combined vertical and horizontal directions give an effect of area and a feeling of equilibrium which can be seen in the work of Willis (Figure 3.25). Aesthetic Log entry AL3:26 refers to the effects of vertical and horizontal composition:

> *The vertical position of the tribe person and the tree intersects with the horizontal planes of the field, mountains and sky resulting in a point of focus that draws the eye of the viewer. There is a sense of vastness of space and balance within the painting.*

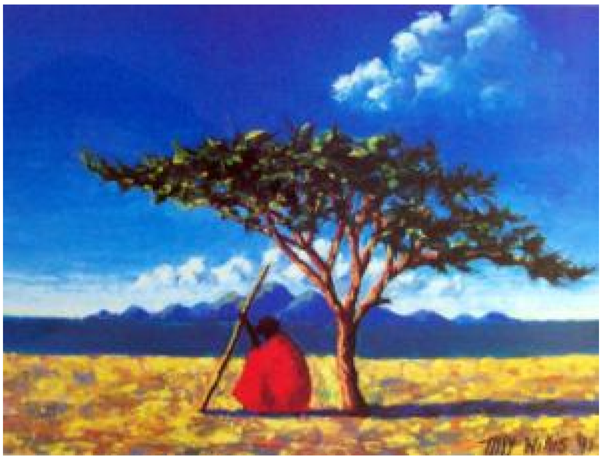

Figure 3.25 Willis, T., (1991) *Untitled*, [Watercolour] *in* Author's Own Collection

Itten (1961/1973:146) indicates that diagonal directions generate the aesthetic qualities of movement and lead into the depth of the picture. Figure 3.26 shows the painting of Cayman artist Lois Brezinski, who used colour diagonals to compose *Rum Point Club.* A contrast of colour along the pebbles leads the eye diagonally along the beach. The intense saturation towards the tree roots in the centre of the painting leads the eye downwards towards the boat that also points diagonally at the tree roots (AL3:27).

Figure 3.26 Brezinski, L., (1996) *Rum Point Club* [Watercolour] *in* Author's Own Collection

Itten (1961/1973:146) also indicates that circular forms generate aesthetic qualities that have a concentrating effect, and at the same time producing a sensation of **movement.** Figure 3.27 shows the work of Bahamian artists Burnside and Beadle where the circular sections of the painting generate movement (AL3:28).

Figure 3.27 Burnside, S. and Beadle, J., (1998) *Enigmatick Funktication in* [Watercolour] Author's Own Collection

Another form of movement is **rhythm**, in which some elements repeat regularly. Figure 3.28 shows the swirl design scarf of fashion designer Paul Smith in which the fluidity of the wavy colours create a rhythmic movement which induces the eye across the fabric as noted in the Aesthetic Log (AL3:29):

> *My favourite textile design - the rhythmic flow of colours. It is peaceful and makes me want to keep looking at it. Designs need not be complex. What is also interesting is that you can see/imagine the design even when folded or around your neck.*

Figure 3.28 Smith, P., *Swirl Print Scarf* [Silk Textile] *in* Author's Own Collection

Whilst the other three Bauhaus[29] teachers Kandinsky, Klee and Albers produced their own theories, Robert Delaunay proclaimed the first theory of colour movement. In a letter to Kandinsky in early spring of 1912 wrote:

> I am still waiting for a loosening up of the laws comparable to musical notes I have discovered, based on the research into the transparency of colour, which has forced me to find colour movement. These things, which I believe are generally unknown, are still in an embryonic stage. Delaunay (1978:113)

Transparency of colour originates from Delaunay's study into stained glass in the holy city of Laon and later in the church of Saint-Severin in the Latin Quarter of Paris. The communication that Delaunay had discovered colour movement based on the metaphor of music was reinforced in a further letter written in 1912 to August Macke:

> An indispensable thing for me is the direct observation of nature and its luminous essence... But what is of great importance to me is observation of the movement of colours. It is only in this way that I have found the laws of complementary contrast and the simultaneity of those colours that nourish the rhythm of my vision. There I find the representative essence – which does not arise from a system, or an a priori theory. (Delaunay 1978:118)

It is clear from a further letter written to Franz Marc in 1912 by Delaunay that the terms 'complementary contrast' and 'simultaneity' led to some confusion:

> I find (and I am terribly sorry about it after reading your letter) that you have understood absolutely nothing about my views... I am not speaking of a mechanical, but of a harmonic movement since it is simultaneity, which means depth, we can see as far as the stars. There is movement... there is nothing that resembles this insight. (Delaunay 1978:116)

Delaunay in this quotation is attempting to explain the difference between the law of **simultaneous contrast** and simultaneity. Chevreul's law of simultaneous contrast states, 'the eye sees at the same time two **contiguous** colours, they will appear as dissimilar as possible, both in their optical composition and in the **strength** of their colour.' (Chevreul, 1839/1861:9) Delaunay clearly defines simultaneity as depth and

[29] Staatliches Bauhaus (full name) occupied three different German locations: Weimar from 1919 to 1925, Dessau from 1925 to 1932 and Berlin from 1932 to 1933. Itten taught at the Bauhaus from 1919–1922. Klee 1920–1931. Kandinsky 1922-1933. Albers 1922–1933.

relates it to movement through transparency and not the law of simultaneous contrast. Goethe (1810/1970:377) had already identified the connection between transparency and depth referring to proximity and distance in his *Theory of Colours*. Therefore, I would argue that it is questionable whether Delaunay can claim to be the first to have discovered a theory of colour movement.

In his book *Concerning the Spiritual in Art,* Kandinsky (1912/1947:58–59) presented a theory of colour movement as shown in Figure 3.29, with two movements of colour.

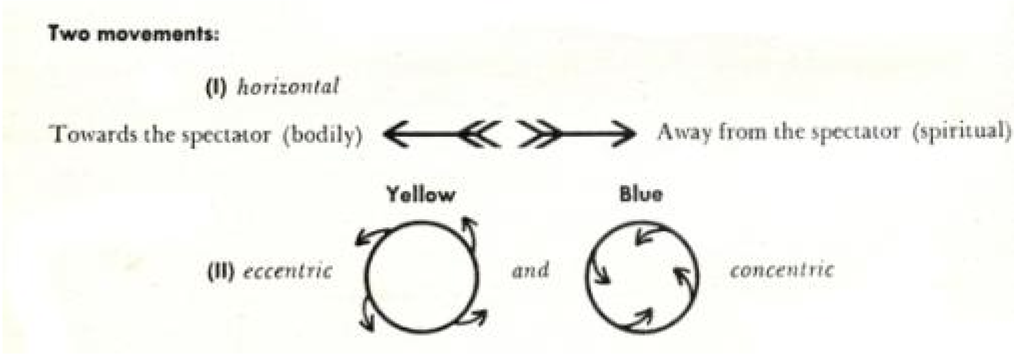

Figure 3.29 Kandinsky, W., (1912) *Colour Movement 1*[Drawing] *in* Kandinsky, (1912/1947:60)

The first is the horizontal plane (viewer to artwork), where yellow moves towards the spectator and blue moves away, which is a reference back to the theory of the cold/warm contrast. The second concerns yellow that has an **eccentric movement** and overruns the boundaries of its form, and blue that has a **concentric movement** and turns in upon its own centre. Kandinsky presents another drawing as shown in Figure 3.30, where the motion of red is within itself and absent from eccentric and concentric directions. It also shows the concepts of eccentric and concentric movements in relation to a hue circle.

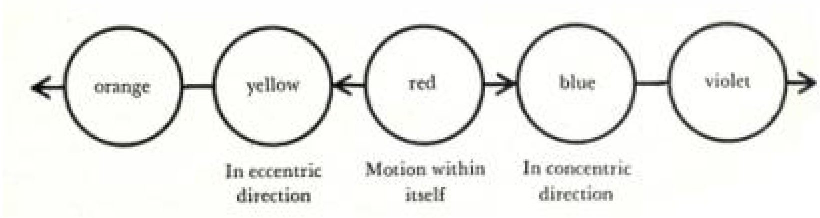

Figure 3.30 Kandinsky, W., (1912) *Colour Movement 1*[Drawing] *in* Kandinsky, (1912/1947:62)

Paul Klee (1956/1961:475)[30] also refers to **movement and countermovement** in his colour movement theory with reference to a pendulum. Figure 3.31 shows the complementary colours of red and green, and as the pendulum swings to the left it favours red and to the right green, with the perpendicular representing the grey (the equal quantities of paint mixture resulting in grey). Whilst this may seem only to have value as a theoretical construct, the eye is drawn to the aesthetic qualities generated by such complementary contrasts in artworks.

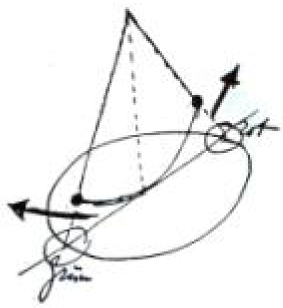

Figure 3.31 Klee, P., (1956) *Colour Movement* [Drawing] *in* Klee, (1956/1961:475)

Josef Albers, in *Interaction of Colour* (1963:62) based his colour movement theory on the **vibration of colours**. Colour vibration manifests itself at the boundary between two juxtaposed contrasting hues, often appearing as shadows on the one side and as reflected light on the other. On other occasions, it is perceived as just a duplication or triplication of the **boundary line** itself. Whilst the theory is related to Chevreul's law

[30] The original reference to the pendulum appears in Klee's Pedagogical Sketchbook (1925/1953: 52–53).

of simultaneous contrast published in 1839, it was Albers who consolidated the phenomena into the art world with a series of paintings where he explored **chromatic interactions** with **nested squares**. Aesthetic log entry AL3:30 refers to direction and movement between and matrix position:

> *On direction and movement there seems to be several possibilities of potential enhancement here with inclusion manipulation combined with the glass void forms, spacing and layering. Inclusion manipulation vertical, horizontal, circular or rhythmic could directionally compliment the voids or not. The physical gap between layers noted in Waller's work could also be replicated by the glass layering combined with the manipulated inclusions. The manipulated inclusions could run parallel to the void form separated by void space to create rhythmic flows as demonstrated by the work of Paul Smith. These aesthetic qualities represent matrix combinations 6, 15 and 24 respectively.*

Simultaneous Pattern **–** Itten suggests a further relationship between colour and composition when he refers to simultaneous pattern:

> Human vision is such that we tend to join like to like, and see them jointly. The likeness may be of colours, areas shades, textures, or accents. During observation, a visual 'configuration' is formed. I call this configuration a simultaneous pattern when it results from the presented relations of likeness, without being itself materially present… The eye tends to put like colours together, so that when the colours are many, several simultaneous patterns may coexist… The effect of composition depends on the forms, features, directions, and spacing of simultaneous patterns. (Itten 1970:92)

Fig. 3.32 illustrates how the eye tends to see like colours together, and how several simultaneous patterns may coexist without being materially present. The red patches form a square, yellow a triangle and blue a simultaneous pentagon. Itten (1961/1973:148) suggests that all simultaneous patterns present should occupy a distinctive situation relative to each other.

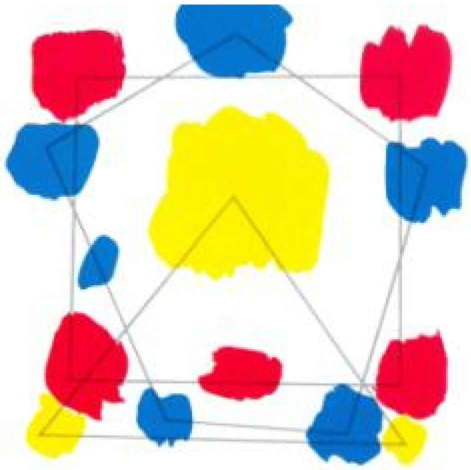

Figure 3.32 Itten, J., (1974) *Simultaneous Pattern in* Itten, (1961/1973:148)

The inclusion size represents patches of colour within the void form and therefore simultaneous patterns have the potential to exist. The occurrence of simultaneous patterns of colour has significant potential because of all the possible combinations of void form and layers. Figure 3.32 also shows background space between the colour patches similar to that experienced when viewing the sample shown in Figure 3.1. These aesthetic qualities represent matrix combinations 5, 14 and 23 respectively (AL3:31).

Colour Optics

My Aesthetic Log (3:32) details the experiences that led to my practice's focus on colour optics. The transmittance of light through transparent material such as stained glass and textile art, the reflection of light from hard opaque surfaces, and the casting of shadows within an artwork are all integral to the visual experience (Figure 3.33).

Figure 3.33 Stella, F., (1982) *Mosport* [Mixed media on etched magnesium] *in* (Rubin, 1987:99)

Physically speaking, objects have no colour and current scientific theory suggests that when light from the illumination source strikes the surface of an object where pigment or dye is present, its **molecular constitution** absorbs certain wavelengths and reflects others, which create the sensation of colour through interaction between the eyes and the brain. Whilst the sciences of physiology and neurology are making progress in understanding this process, no consensus on a definitive theory has emerged (Lamb and Bourriau 1995:4–9). Absorption and reflection are not the only means by which the different wavelengths of white light are selectively interfered with resulting in perceived colour. The colour experiments performed by Isaac Newton (who proved that white light was not pure, results that agitated the church) were based on wavelengths of refracted light as they passed through prisms Newton (1704). The sparkles of hard surfaces such as diamonds are diffracted wavelengths and the scattering of light waves in all directions causes the blue colour of the sky.

Itten (1961/1973:54) points to the effects of illumination on light/dark contrast in that red, orange and yellow appear darker in reduced light, while blue and green appear lighter. This phenomenon, known as the **Purkyně effect** or shift, was discovered by Jan Evangelista Purkyně (1825:109-110), who realised that the eye has not one but two systems adapted to seeing colours, namely the **rod** and **cone photoreceptors** of the **retina**. Rods are very sensitive to light and mediate vision in dim light, whereas cones are less sensitive and mediate vision in normal daylight. Rods and cones are not equally sensitive to visible wavelengths of light. The sensitivity of the eye changes from the red end of the **visible spectrum** toward the blue end when shifting from high to low light energy levels (American Optometric Association [Online]). Light energy does not only affect the colouration of objects but also their three-dimensional qualities, a point made by Itten (1961/1973:124), that the **plastic effects** caused by the cold/warm contrasts decrease in low-light levels. Albers (1963:63) also points out that the boundaries of analogous colours disappear under equal lighting conditions provided the material colour is of the same **brilliance**. The colour theory of Goethe (1810/1970:lvi) was also based on the principle that to perceive colour there must be light. My Aesthetic Log details several pages of colour theories and models, however none of them referred to the integral nature of light as part of the artwork. A note in the Aesthetic Log (AL3:33) suggests the need for more research:

The problem is that most galleries hang paintings on the wall with non-specific illumination. Whilst I can trace back through Itten and Albers to Goethe they only explain light in the most general terms. I need to find something more specific.

The effects of colour optics that are most significant to this research study are captured in an Aesthetic Log entry (AL3:34) when referring to the sample (Figure 3.1):

The glossiness of the glass surface makes the colours seem more vivid than they really are. The colours of the recycled inclusions look different outside compared to when they are inside the glass. They look different again in daylight and under artificial light. The colour changes as I move around the sample from being highly vibrant to less vibrant and finally to almost unrecognisable as the reflection stops me from observing the colour. If I hold the sample in front of a window all I see is bright light through the transparency of the void space and the detail and colour within the voids appears black. If I place the sample onto a white background and reduce the light I still see the texture within the voids but the quality of the colours change. The further I move back from the sample the more the texture and boundaries seem to fade.

***Transparency and Colour* –** This research uncovered a relationship between light and glass that dates back to the first century AD and **early Christian mosaics**. Whilst most writings on mosaics focus on the context of the **Christian iconography** of light, I found evidence concerning the **physical optics** and colour that was significant to this research study.

References to Roman techniques of **burnishing**, **grinding smooth**, **waxing and polishing** not only to bring out the colour but also to produce a highly reflective surface are common throughout the writings of early art (Gage 1993:50). Mosaics achieved **luminosity** by employing the material properties of glass, namely transparency and high reflectance. **Sandwich glass** is the name given by glass historians to the technique used for making glass mosaics. Bright colours including **gold leaf** were fused between two layers of glass to create little glass cubes to enhance their brilliance. My research found that most writings of the thirteenth century referred to transparency in the context of transmittance of light through **stained** or clear glass to the interior of the building with the exception of the Italian artist Lorenzo Ghiberti (Gage 1993:75). Ghiberti’s concern was with the collection and refraction of light in reference to the transparency of gemstones, which is a similar context to **glass tesserae** and the situation most common to my practice. Aesthetic Log entry AL3:35 shows some sketches relating to these differences and a theory for explaining why the colour is enhanced. It also shows the effect of refraction on the appearance of depth. This entry was significant to my practice because it removed anxiety that had built up during the research process in terms of trying to contextualise my practice in the field of stained glass, given the natural affinity of clear and coloured glass in a flat plane relating to this medium.

The enhanced brilliance of the colour due to a layer of transparent glass was noted in Aesthetic Log entry AL3:36 in preliminary testing of coloured glass from different manufacturers (Figure 3.34) and the relevance to the matrix:

> *The colours from some manufactures are just too luminous compared with those from Desag Artista and overpower the inclusions... The colours of the inclusions are heightened when inserted into the glass voids. The entry draws attention to the potential of enhanced colour caused by the glass, both in terms of the inclusion type within the voided forms and their contrast with void space if the background comprised of coloured glass. Where the third layer of glass does not include a void form it creates an added thickness to the first layer and void form which also alters the refraction of the ray of light. These aesthetic qualities represent combinations 7, 16 and 25 respectively in the matrix.*

Figure 3.34 Topham, S., (2008) *Tray 1 Desag Artista*[31] *Glass Samples with Inclusions* [Coloured Glass and Recycled Inclusions] *in* Aesthetic Log (AL3:36)

***Reflection and Colour* –** That light was necessary for the perception of colour was also the primary understanding held by early Christian mosaicists in their search for luminosity. Gage (1993:46) suggests that most of the religious rituals of the Eastern Church took place in the evening. Therefore the majority of the light used to illuminate mosaics was generated artificially and internally where angles of reflection could be controlled more precisely. Gage refers to several descriptions by travellers of **artificial lighting**:

> Some six hundred oil lamps burning on the name-day of the saint... the great double ring of lamps with silver reflectors under the dome, the rows of lamps down the aisles, around the edges of the galleries and the base of the dome, along the chancel screen and even on the floor... the air disturbed by the processions must have caught the flames causing a flickering of light. (Gage 1993:47)

This change was not only due to atmospheric variances; the unevenness of the **inclination angle** setting of the glass tesserae mosaics would also return differentiated reflected rays as the spectator moved. The literature review that I carried out found primary evidence to support that the tesserae had been deliberately set at an angle to

[31] Tray 1 Coloured Artista Firing Schedule Appendix 8.

enhance reflection. Information regarding the setting of tesserae only becomes available during restoration work when the observer is close to the mosaic. On contacting the curator of Princeton University's Department of Art and Archaeology, I was put in contact with Father Justin at the Monastery of St Catherine (built AD 330), Mount Sinai, where a major restoration of its mosaics was just ending. After climbing the scaffolding, Father Justin (2013 [Email]) emailed the following response:

> The gold tesserae on the apse of the Transfiguration mosaic are flat to the surface, but the gold tesserae on the upper vertical panels (the two Angels, the Burning Bush, and the Reception of the Law) are slanted down to the angle of the viewer, with space left between the rows, that is not visible from below.

Figure 3.35 ***Mosaics Burning Bush*** **[Glass Terrase]**
(Courtesy of Father Justin St Catherine Monastery, Mount Sinai)

Figure 3.35 shows the unevenness of the mosaics and the space left between rows referred to by Father Justin in his email. My research found further evidence to support the claim that mosaics were set deliberately at an angle to reflect light from the reports of the restoration work of the Hagia Sophia in Istanbul headed by Thomas Whittemore in 1935 (Figure 3.36).

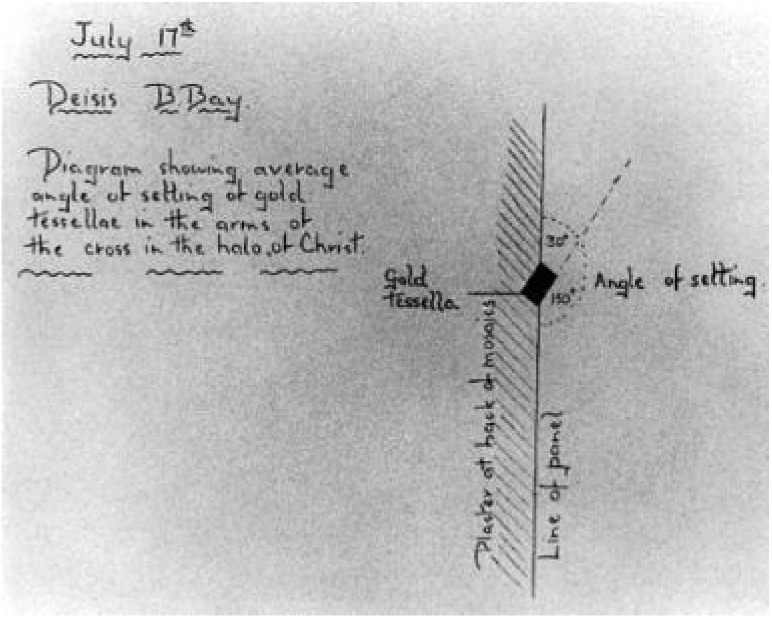

Figure 3.36 (1935) Inclination of the tesserae [Black ink and pencil on Paper] *in* Byzantine Institute, W. Gregory, diary, (1935, notebook 15)

In addition to the 30º angle, Whittemore (1933–1934:10–14) recorded the significant differences in the inclination of the tesserae in different areas of the church, concluding that a higher inclination of tesserae may have been used to increase luminosity.

An explanation of the optical theory and how it is likely to affect the research study appears in the Aesthetic Log (AL3:37). The angle of viewing and the angle of reflection caused by the void form, layer or coloured background space will affect the intensity of the colour. In addition to the high **surface reflectance** of the glass, the reflective qualities of the inclusion type will also add to the intensity of colour. The angle of the inclusions within the void or layer due to the manipulation could also affect the intensity of colour. These aesthetic qualities represent combinations 7, 9, 16, 18, 25 and 27 of the matrix.

Optical Colour Mixing **–** Claudius Ptolemy's theory of visual perception in the second century AD (translated by Smith in 1966) identified distance as one cause for **optical mixture** (Smith, 1996:53).

Figure 3.37 Kluge, N., (1930) *Tracing of Virgin Head Mosaic in Hagia Sophia* [Mosaic] *in* Kluge, (1930)

Figure 3.37 shows a tracing described by Kluge (1930) of the mosaic of the Virgin's head in the Hagia Sophia:

> The largest tesserae outlined her nimbus, the silhouette of her head, and the folds of her garments. Medium-sized tesserae outlined her face and facial features, including her eyes, nose, and lips. The smallest tesserae modelled the flesh tones of her cheeks, forehead, nose, chin, and neck. (Kluge, 1930)

The use of the small tesserae for the modelling of the flesh tones would result in the different colours merging together to give an optically mixed new colour due to distance. The larger-sized tesserae create a boundary to contain colour and the optical mixtures. These boundaries comprise of coloured tesserae, or in the case of the mosaics in the monastery of St Catherine, 'space between the rows' as described by Father Justin in his email, 'not visible from below'.

An entry into the Aesthetic Log (AL3:38) when viewing the sample (Figure 3.1) also suggests a link between the merging of the colour in the inclusions' small fragments and constraining boundaries.

> *At a distance colours seem to merge, it is as though the edges of the coloured inclusions soften, it prevents me from seeing the original colour. I see a different colour more intense I think. The boundaries of the large inclusions do not disappear. The edges of the voids are particularly interesting from above I can see boundaries all around the contours of the voids. I think I am seeing the edge of the glass as it falls away due to slope of the void form. The boundaries that appear as light grey are most significant with the violet colours perhaps because of its light/dark contrast. When I view the sample from different distances I lose sight of the void boundary but the plastic effect tells me that it must still be there. It seems that the void boundary is also affected by the size and manipulation of the inclusions the finer the inclusions the more pronounced the boundary.*

The theory of why colours merge in this way is often associated with the law of simultaneous contrast as noted by Chevreul (1839/1861:595). Seurat's *Bathers at Asnières* (1884) was painted using a technique described as **pointillism** by juxtaposing small areas or dots of pure colour so that the eye and brain can mix them into a single colour impression. However, Chevreul law of simultaneous contrast states that this effect is less evident in vivid light than in weaker light, and therefore due to the high number of lamps used may not be the cause of colour change.

Ptolemy also analysed another instance of optical mixture, known as **colour spread**, which refers to the optical mixture of a colour on one tesserae appearing to spread to surrounding tesserae (Lejeune, 1956:15-17). The strategic placement of singular tesserae of a different colour as shown in Figure 3.38 shows the detail of the placement of red tesserae on the cheek and chin that would have created this effect.

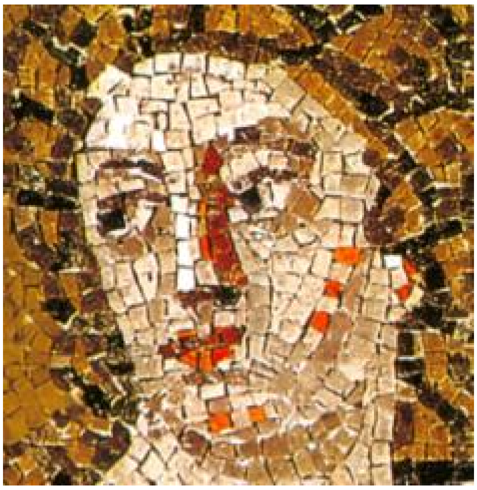

Figure 3.38 S. Prassede, Chapel of S. Zeno, Rome, vault mosaic detail ninth century [Mosaic] ***in*** **Gage, (1993:51)**

Another technique allowed the cubes to project up to a quarter of their thickness from the plaster bed, reflecting the colour of the glass body over the surrounding tesserae. I would therefore argue that it is likely that these specific reflective techniques were the basis for colour optical mixing rather than those proposed by Chevreul.

The relevance of optical colour mixing to this research study and the matrix positions with reference to Figure 3.1 is explained in my Aesthetic Log (AL3:39):

> *The fragmentary nature of the various sizes of inclusions in the void form and layers allows for a range of optical mixing by size and colour. There is also potential to reduce the background space to an absolute minimum so that the area covered comprises mainly of inclusions. This would allow optical mixing to take place between the inclusions within the voided forms and the colour of the background space. These aesthetic qualities represent combinations 8, 17 and 26 in the matrix.*

Summary: Chapter Three

The preliminary sample proved useful in identifying three groupings of colour theory most relevant to the defence of point ‘X’ at which all three circles intersect, namely colour contrast, colour composition and colour optics. I discovered that each grouping could be subdivided to represent discrete elements of colour theory, some dating back to early Christian mosaics of the first century. The colour theories were combined with the glass and inclusion parameters into the matrix as shown in Appendix 12 to complete the conceptual framework for the assessment of the aesthetic qualities.

Colour Contrast	Colour Composition	Colour Optics
Light/Dark (7)	Harmony (3)	Reflection and Colour (6)
Hue (3)	Direction (3)	Transparency and Colour (3)
Cold/Warm (3)	Simultaneous Pattern (3)	Optical Colour Mixing (3)
Extension (3)		
Complementary (3)		
Saturation (2)		

Figure 3.39 Topham, S., (2013) *Colour Theory Occurrences in Matrix* [Table]

The table shown in Figure 3.39 shows each specific colour theory by groups suggesting a potential of 42 aesthetic qualities which have links back to colour theory. The figures in the brackets represent the number of occasions that each aspect of colour theory occurs in the matrix of Appendix 12, the highest being Light/Dark Contrast and the lowest being Saturation Contrast. Having said this, these aspects of colour theory have been based on the assessment of a sample, and like all conceptual frameworks it is only a guide. Therefore, in the experiments which follow the unexpected may also lead to new aesthetic qualities that might benefit my practice.

The most surprising insight of examining colour theory was stimulated by a response to a question often asked by Itten's students: 'In the realm of aesthetics, are there general rules and laws of colour for the artist, or is the aesthetic appreciation of colours governed solely by subjective opinion?'. Itten writes:

> If you, unknowing, are able to create masterpieces in colour, then un-knowledge is your way. But if you are unable to create masterpieces in colour out of your un-knowledge, then you ought to look for knowledge. (Itten, 1961/1973:12)

Without presuming to call my artworks masterpieces, I have never looked towards colour theory for the creation of my work. Yet the examples of artworks of living artists referred to in this chapter are from my own personal art collection which I have gathered on my travels, all of which inspired me in some way to buy them. To my surprise I discovered that these artworks exemplify the aspects of colour theory most relevant to my research. This insight combined with the knowledge of colour gained from the literature search undertaken significantly increased my confidence and ability to assess and explain the aesthetic qualities of my work.

Chapter Four

Small Glass Experiments

This chapter begins with a discussion of my practice and the tensions between the anticipated roles during the research. This is followed by brief descriptions of the main preliminary experiments significant to this research study. Twelve small glass experiments are then discussed in terms of inspiration, technical principles and colour theory. The chapter is concluded with a summary which reflects on the role of artist maker, designer maker and researcher maker in relationship to moving my practice forward.

Practice Foundations and Tensions

The basis for my practice can be traced back to 1994 when I first met with Michael Adams (AL4:1):

> *He asked me to look at a dark green leaf and then held it up to the sunlight so that the colour changed. He explained that the ultraviolet light was so strong in the Seychelles that it seemed to penetrate the leaf whereas in England the light is reflected from the surface of the leaf.*

The connection between nature, colour, light and location suggested by Adams has significant place in art history. Patrick Heron's letter to Herbert Read written in July 1956 (Gooding 1994:94) captures the excitement of the first few months at Eagles Nest: 'Here at last! I wish you could see the place today in its Mediterranean brilliance of light and colour'. Paul Klee (1964:297) in his diaries wrote whilst on his Tunisia trip, 'Colour possesses me. I don't have to pursue it. It will possess me always, I know. That is the meaning of this happy hour. Colour and I are one. I am a painter'. This connection between nature, colour, light and location has always been the basis of my practice.

Prior to commencing experimentation, there was some tension about my role during the research as noted in the Aesthetic Log (AL4:2):

> *I am aware of a tension, how I combine the roles of structured making of the glass with the freedom of producing art. I suppose I am talking about the roles of designer-maker and artist-maker.*

Pye (1964:7) says of this difference 'that the main thing which sharply distinguishes useful design from such art as painting and sculpture is that the practitioner of design has limits set upon his freedom of choice. A painter can choose any imaginable shape'. For this research, I had to design and produce glass based on the techniques of core forming and trapunto, which have constraints in terms of scale, void shapes and void positioning, thus limiting my freedom of choice. Pye (1964:8) also refers to **function** as an essential element of design. The glass also has a function, because the voids hold the inclusions in place. Therefore in terms of the designer-maker role, I needed to produce the glass in a constrained and methodical way.

Dormer (1994:7) on the other hand refers to the artist/maker role as 'painting, sculpture and studio craft whose content is substantially dependent on practical skill, and whose intention is discovered through the process of making the object'. Dormer highlights the role of **discovery** during the making process as opposed to the preconceived nature of design. Gray and Malins (2004:1) suggest that discovery occurs through the process of experiential learning when they write, 'We learn most effectively by doing – by active experience and reflection on that experience'.

Dewey's (1934:36–59) examination of experience led to an entry into my Aesthetic Log (AL4:3):

> *The experiential learning cycle has never had deep meaning for me it seems like an obvious statement. I like the idea of how Dewey defines experience, it is not just any experience it is one which has a definite starting and ending point, a conclusive experience.*

The idea of the **conclusive experience** led me to consider my role as researcher-maker, a role that emphasises the relationship between research and the creative practice of developing studio work from both designer-maker and artist/maker standpoints. In 1938 Dewey outlined an experiential learning process in his book *Experience and Education* (Figure 4.1).

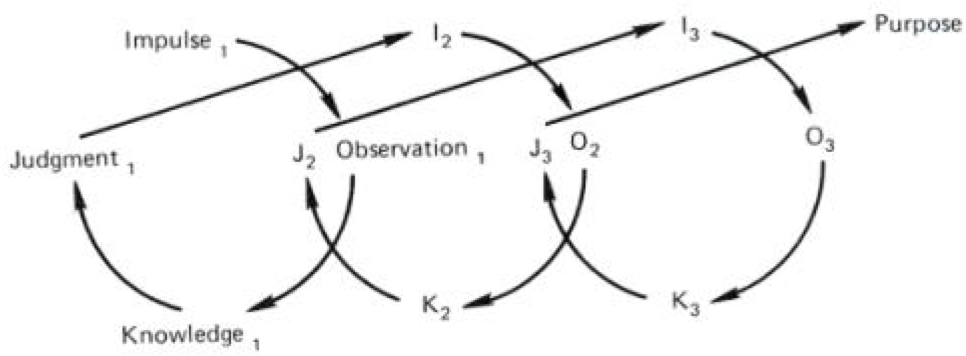

Figure 4.1 Dewey, J., (1938) Dewey's Model of Experiential Learning [Illustration] *in* Dewey, J., (1938:69)

Dewey explains this model:

> It involves:(1) observation of surrounding conditions; (2) knowledge of what has happened in similar situations in the past, a knowledge obtained partly by recollection and partly from the information, advice, and warning of those who have had a wider experience; and (3) judgment, which puts together what is observed and what is recalled to see what they signify. A purpose differs from an original impulse and desire through its translation into a plan and method of action based upon foresight of the consequences of action under given observed conditions in a certain way. (Dewey, 1938:69)

Dewey's model had an immediate impact on my research and one which I felt was significant in terms of how I moved forward (AL4:4). I imagined each cycle as an experiment and as a conclusive experience. Information could be obtained from each of the stages which could be entered into the Aesthetic Log and which in turn would form the basis for my thesis. I also liked the visualisation of movement through the research, from one cycle to another, and the purpose as being the plan that would help draw insights into my relationship with the material processes as a way of further understanding my own artistic practice.

Preliminary Experiments

I carried out a number of preliminary experiments to determine the likely technical problems and to identify potential colour schemes. The first group of experiments (AL4:5, AL4:6, AL4:7 and AL4:8) highlighted some of the technical difficulties associated with the research study, namely that of **heat distribution**, **weak web sections** and void spacing that were too small and which prevented the glass from slumping. The heat distribution would be significantly affected by the amount of core material within the design because of its insulation properties. The amount of core-forming material within a design depends on its composition and size of glass used.

I conducted the preliminary experiments using a small kiln with side heating elements designed for use as a ceramic kiln (AL4:9). I considered it to be a pointless exercise to conduct further development using a kiln which was unsuitable to produce the main experiments of the research study. Therefore I decided to design a kiln in conjunction with the manufacturers[32] to produce the ideal specification (Appendix 15). I contacted

[32] Northern Kilns Limited.

the electricity supplier, who came and upgraded the domestic electricity circuit (AL4:10). Certified electricians came and installed a 25-metre long cable (AL4:11). The kiln was finally delivered (AL4:12), installed (AL4:13) and tested (AL4:14). Aesthetic Log entry AL4:15 recalls my anxiety about the house lights flashing and the noise the kiln made during night-time operation.

I conducted a second group of preliminary experiments to determine the colour recipes for hand-dyed cotton[33] (AL4:16) and silk fibres[34] (AL4:17) and colour schemes by building pages of inclusion types within the Aesthetic Log (AL4:18). However, this was not very successful because the samples did not represent the three-dimensional fragmented look of the inclusions within the void forms and the background void space was not represented. I therefore decided to produce 30 single-layer voided samples[35] which included various types of inclusions and backgrounds to identify potential combinations (AL4:19). The samples produced a number of interesting observations.

The use of patterned textile backgrounds complicated the design (AL4:20). The use of plain fabric backgrounds such as hessian could be used to compliment the colours and texture of the inclusions (AL4:21). The use of coloured silk paper proved to be an effective background (AL4:22). The use of plain white cotton fabric proved an excellent background material as it appeared clean and crisp and gave maximum definition to the void shapes and inclusions within them (AL4:23). Adding a transparent blue glass base layer over a white mountboard background enhanced the

[33] Hand Dyed Cotton Recipe Chart Appendix 16.
[34] Hand Dyed Silk Fibres Recipe Chart Appendix 17.
[35] Firing Schedule Appendix 18.

contrast of the voids and inclusions (AL4:24). Medium-sized fabric inclusions created a flaky effect whilst smaller sizes produced detail (AL4:25). Silk fibres produced better colour blending and their placement could be more accurately controlled (AL4:26). Found items invoked the memory and added a degree of realism to the artefact (AL4:27). The preliminary experiments had generated an initial level of knowledge that gave me confidence to move forward with the next stage of the research.

Small Glass Experiments 1 to 12

The aim of the small glass experiments (between 750 cm^2 and 2,000 cm^2) was to identify a set of principles for making the voided glass and assess the aesthetic qualities so that my practice could move forward to working with large pieces of glass. A timeline for the small glass experiments is given in Appendix 19. This time was divided between the kiln processes, core removal, insertion of inclusions and framing.

Experiment 1: Aesthetic Log AL4:28 to AL4:38 – Firing Schedule Appendix 20

Figure 4.2 Topham, S., (2008)
Experiment 1, Pointe au Sel
57 cm x 14 cm

The main inspiration for this experiment came from a painting by Michael Adams entitled *Northolme* which captured the lovely blue hues and waves of the Indian Ocean surrounding the Seychelles (AL4:28). The basic components of the design and composition which include varied void spacing are listed in the table (AL4:29). The observations of the finished artwork were recorded in the Aesthetic Log (AL4:30):

> *The ocean is a major inspiration in my life. I wanted to depict this in my work. Noticing the natural yet ever changing curves of the waves, the colour blends within the water and the flow of the current. I feel this piece does not achieve any of these three things. The proportions do not suit the theme. In my mind, the ocean is a long vast horizontal open area of water. My brain is telling me there is something wrong, it just does not look or feel right. The sides need to be extended horizontally. At the moment it's vertical and I don't like it. Really disappointing.*

Technical problems plagued this experiment right from the start. I had trouble cutting the large glass sheets (AL4:31). The reason why this artwork was so narrow was due to an incorrect firing schedule that caused the top edges of the voids to creep back at least 1.5 cm, making them very thin, brittle and sharp. I tried using a tile table saw to recover the glass but this caused the top void layer to break away reducing the width to nearly half (AL4:32).

When cutting out the fibreboard I was constantly trying to get across the feel of the natural organic lines and shapes of the waves. The board was placed within the sandwich of glass layers and I remembered feeling quite pleased with myself and thought I had successfully represented the lines of the ocean. Opening the kiln door and removing the fibreboard, I still felt the same way. Once the inclusions were added and the piece was finished and hung, I stood back and admired my piece. My heart then sank (AL4:33):

Everything about the void shapes are wrong. The curvature, the angles, the placement and the spacing, are all just so wrong. It's as if the voids are fighting against each other. There is no rhythm, no flow, no fluidity. The top void forms are in discord with the bottom void forms. The top and bottom void layers have not aligned with each other. I think it's the positioning and the placement of these void forms that have spoilt the overall look. Spacing plays a big part in the downfall of this piece. Unsightly white gaps glare out at you. Not helped by the discord of the void forms. I feel I have this constant need to go up and fill the gaps in with colour!

Figure 4.3 Topham, S., (2008) Experiment 1, Digital Separation *in* Aesthetic Log (AL4:34)

Figure 4.3 shows a **digital separation** of the image of the final artwork into void space background (left), bottom void layer (middle) and upper void layer (right). The image of the top void layer immediately illustrates the poor void forms of the waves and the unevenness of the void spacing (AL4:34).

Relating these observations back to Chapter Two, Van den Burghr (p25) suggested that the raised elements of the design should be the focal point of the fabric manipulation process. This is understandable because traditional trapunto only uses one raised layer and therefore the harmony between the raised sections and non-raised sections would easily be identified. Experiment 1 showed the composition to be significantly more complex, and therefore required a visualisation process that dealt with void form, spacing and layers as one.

The observations about colour are noted in the Aesthetic Log (AL4:35):

> *I am happy with one aspect of this piece! The colour blend and graduation of the colours might not be spot on for my liking but the inclusions themselves have served their purpose well. I love this idea of chopped up recycled matter, mixed together and pushed into a contained space. The textiles mould themselves in the voids beautifully. From a distance the colours are one, whites blending into light blues followed by mid tone blues and finally into dark blue and navy tones. But on closer inspection you can see that the 'whites' are actually a mixture of whites, the 'light blues' are a blend of multi coloured blues and so on.*

My observations link back to the matrix (AL4:36) and colour theory for example the manipulation of the inclusions create graduations of colour in each void layer (Figure 4.3) which draws the eyes from the top to bottom of the work (colour direction). Figure 4.2 show that the colour graduations caused by the inclusion manipulation are enhanced by the void layers to create planes within the artwork (light/dark contrast). The inclusion manipulation within the void forms creates folds in the material which also affects the contrast of colour (light/dark contrast). The colours and boundaries within each void layer disappear at a distance due to the inclusion size (optical colour mixing). During the firing process some of the top void strip edges had been dragged down into the glass (Figure 4.4). This had been caused by the upper void strips overhanging the lower void strips by more than 50%. This affected the angle of reflection from the void form and the manipulated inclusions causing the colours to appear less vibrant (reflection and colour).

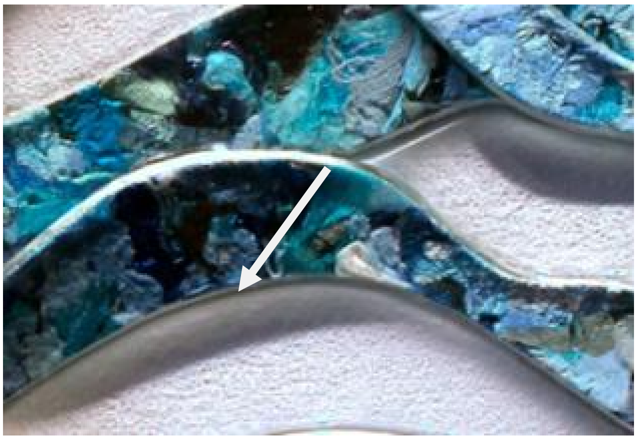

Figure 4.4 Topham, S., (2008) Angle of Reflection *in* Aesthetic Log (AL4:36)

Aesthetic Log entry AL4:37 describe the significant difficulties that had to be overcome in framing the artwork.

Reflecting on the experiment and my entries into the Aesthetic Log I discovered a number of technical principles (AL4:38). The poor top void edges suggested that too much heat was being applied to the top surface of the glass, confirming that the optimum maximum process temperature for smaller-sized glass was lower than 820°C and amendments to the firing schedule needed to be made to ensure the even distribution of heat and gas escape. The overlapping of the void strips had impacted on the reflection angle and reduced the intensity of the colour. Even though there was a significant design element to my research, there was also much discovery in terms of the outcomes. The void forms and spacing had looked good right up until the artwork was hung on the wall, and this left me with some anxiety about the visualisation of the final piece. Whilst I had anticipated the roles of artist/maker, designer/maker and researcher/maker, what I did not account for was the continual need to find solutions to problems that the experiment generated. Having said this, the experience gave me confidence in my problem-solving abilities and inspired me to carry on.

Experiment 2: Aesthetic Log AL4:39 to AL4:47 – Firing Schedule Appendix 21

Figure 4.5 Topham, S., (2008) *Experiment 2, Jardin des Enfants*, 23 cm x 52 cm

The main inspiration for this piece came from a painting entitled *Anse Aux Poules Bleus Hoareaus* (1993) by Michael Adams, who captures the spirit of the dense rainforests of the Seychelles, highlighting some shapes with gold leaf (AL4:39). The basic components of the design and composition which include varying void forms are listed in the table (AL4:40). My reactions to the finished piece (Figure 4.5) were recorded in the Aesthetic Log (AL4:41):

> *Very disappointing, experiment two seems quite tarnished almost a mucky appearance. I have to admit this has to be one of my worse pieces... the finished look didn't work so well. I filled the shapes with copper leaf. I had high hopes for the copper leaf but the final effect was a disaster. The copper leaf picked up ever little imperfection and the rough texture from the fibreboard and highlighted it!... The use of metallic gold lamé textile to cover the background was a big mistake, again every blemish was picked up. The metallic lamé was supposed to highlight shapes, it was supposed to give a warm luxurious feel under light. Instead, when the light shined onto the piece, crinkles and bubbling appeared within the gold lamé background giving unsightly and rather random shadows. The overall look was unprofessional and an amateurish representation of the rainforest... I am not happy with the void shapes. They seem to be all over the place. Too much space between them and some bottom void shapes finished half way across the piece, stopping the rhythm. Apart from the inclusions within the voids, there is not one thing I like about it. The intention was there, it just didn't result in the same way I had hoped.*

In addition to the vertical void forms in each layer, figurative void forms were inserted in the base layer of the glass (Figure 4.6).

Figure 4.6 Topham, S., (2008) Figurative Forms in Base Layer *in* Aesthetic Log (AL4:42)

This technique relates to the one used by Ruthven, 2005 (AL1:2). It did create the illusion of depth and one of figures peering through from behind the trees similar to that of Adam's *Anse Aux Poules Bleus. Hoareaus* painting. The firing schedule (Appendix 21) was amended to reduce the maximum process temperature to 800°C, which improved the upper void form edges compared to those of Experiment 1. Aesthetic Log entry AL4:43 highlights another problem with the edges of void spaces bulging due to the mass of glass. The problem was solved by purchasing a diamond grinder to grind the bulges away. The lower voids were all closed off preventing contamination of the inclusions, suggesting that the heat had penetrated the bottom layers and indicating the correct firing schedule had been used.

My observations concerning the aesthetic qualities of colour and inclusions were noted in the Aesthetic Log (AL4:44):

> *I am happy with the inclusions and the colours. I just would have liked a little bit more. The bottom layer I used thicker voids in the hope that I could create a more dense feeling by inserting and compacting more inclusions. The top layer I went for long thin voids that were placed over the bottom voids... It looked alright – nothing special about it. I had inserted darker coloured tones in the bottom layer, and bright yellows and greens in the top layer voids... Quite pleased with the colour contrast between the two layers... I didn't chop the inclusions as thinly as in the lower void layers which highlighted the inclusion manipulation. The fabric creased and shadows formed... In the top layer, the inclusions were smaller, similar to experiment one. I added seed beads which moulded their way around the other chopped inclusions. It was fascinating watching them move their way through the voids, passing everything that tried to block their path. They were a great success and something I'd use again.*

In terms of relating my observations back to the matrix and colour theory (AL4:45), the vertical void forms in both layers created a sense of height which was enhanced by the vertical inclusion manipulation (colour direction). The inclusion manipulation created different contrasts of colour in the upper and lower void layers (light/dark contrast). The inclusion size within each void form also affected the contrast of colour (light/dark contrast). The inclusion manipulation in the lower void forms created shadows and boundaries that contrasted with the figurative void forms in the base layer creating two distinct planes within the artwork (light/dark contrast).

Reflecting on the experiment and my entries into the Aesthetic Log, I identified further technical principles (AL4:46), that moved the technical development of my practice forward relating to the top process temperature, use of base layer figurative forms and the effects of glass levelling. I had a major concern at this stage of the research (AL4:47) with the aesthetic quality of my artwork. Both experiments had produced results that were disappointing to say the least and this made me anxious in terms of producing high-quality artwork. It was fair to say that my mind had been full of technical issues and their resolution during the research thus far, but these were no excuse for the poor outputs, they simply did not look right. On reflection I began to question the relationship between artist/maker, designer/maker and researcher/maker. In my obligation to satisfy all three roles in addition to colour, I had begun to take other aspects from the paintings and 'test' them within my own artwork, for example the wave shapes and the 'looking through the rainforest'. I felt that this had led my artwork to be designed by specification rather than created from inspiration, something I needed to reflect upon before the next experiment.

Experiment 3: Aesthetic Log AL4:48 to AL4:53 – Firing Schedule Appendix 22

Figure 4.7 Topham, S., (2008) Experiment 3, Virgin Forest, 24 cm x 74 cm

The inspiration for this experiment came from my fond memories of previous visits to the Seychelles, as recorded in the Aesthetic Log (AL4:48):

> *When I think of the Seychelles, the image that comes to mind straight away is the rainforest dense and full of colours and forms. On my last visit I recall sitting amongst the trees with nature surrounding me in every direction and new shoots coming up through the enriched soils. I felt the warmth and humidity and my ears were filled with the overwhelming noise from the island's birds, tree frogs and lizards.*

When contemplating the voids before kiln firing (AL4:49), I decided upon the 'two thickness' approach that I had previously used in Experiment 2. The bottom layer would house thicker voids and the top layer thinner voids. This time I produced a couple of fork-like shapes, as this is a very common shape in the rainforest. I overlapped some top layer voids with the bottom layer voids and spread them evenly across the piece. The inclusions were very much based on the colours I had picked up from the rainforest, mainly green and blue tones and flecks of orange. I also used quite a bit of luminous green colour textiles and mixed them with the other recycled inclusions. I wanted to try and capture the speckles of sunlight as they caught the trees and leaves in the rainforest. I added darker hues on the lower void layer and lighter ones in the upper to create the illusion of depth and that of looking through the rainforest. The inclusions consisted of chopped recycled textiles including cotton, velvet, organza, plastic fruit nettings, sweet wrappers, yarns and hand-dyed silk fibres. The artwork was framed with a white wooden mount and a pre-coloured stock wooden frame.

The final piece (Figure 4.7) was one of delight and excitement and a definable turning point in the research (AL4:50):

> *There is something very different about this piece... it's beautiful. The contrast between the bright and the darker tones are fantastic. I love this colour scheme. Even more exciting are the speckles of orange dip dabbing their way through the trees. The orange gives a certain lift to the green colours. The inclusions were cut quite finely causing a very mottled effect which I liked as this reminded me of all the natural flakes of colour of the tree trunks. Once the voids were filled and the piece was hung under lighting, I began to notice something quite amazing. The light shining onto the piece picked up certain colours, even changing them in some cases. When I moved slightly the light then highlighted another colour and did the same and so on. It seemed the colours within the piece were changing right before my eyes, absolutely beautiful. Not only that, the light highlights the angled edging of the voids causing them to give off a certain 'glow'. The voids remind me of entwining vines, the organic shapes work so well together. The inclusion types and colours mix so well together and give a great colour contrast between the two layers. And the white background creates a crisp freshness to the overall look and aesthetic of the piece. A beautiful piece, that reminds me of my time and feelings when I was in the rainforest.*

There are several aesthetic qualities that can be related back to the matrix and colour theory (AL4:51).

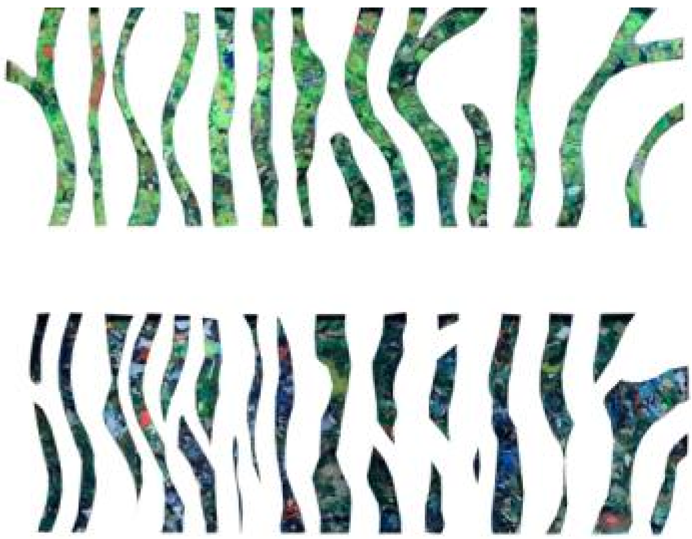

Figure 4.8 Topham, S., (2008) Experiment 3, Digital Separation *in* Aesthetic Log (AL4:51)

The digital separation of the image (Figure 4.8) shows the contrast between upper and lower void layers mainly due to the variance of the inclusion types (contrast of hue).

The overlapping of the upper void strips by more than 50% of the lower void strips resulted in an alteration to the reflection angle from the void form sides and manipulated inclusions (reflection and colour). The surface texture of some inclusion types and the void form also altered the reflection angle (reflection and colour). The variance in lustre of some inclusion types combined with the void form transparency enhanced the vibrancy of the inclusion colour as shown in Figure 4.9 (transparency and colour). Even though the upper void layer meandered significantly over the lower void layer, the inclusion manipulation ensured that the vertical colour direction remained distinctive (colour direction).

Figure 4.9 Topham, S., (2008) Experiment 3, Three Dimensional Surfaces *in* Aesthetic Log (AL4:51)

The inclusion size within the void forms gave a mottled appearance which became less intensive when viewed from a distance (optical colour mixing). The inclusion size of the orange resulted in a very small area having a significant impact within the void form (contrast of extension). The inclusion type of an ice-white mountboard provided significant contrast between the void spacing (light/dark contrast).

Technically the piece was almost perfect – the edges just needed a slight grinding to enable the piece to be framed. I had made a change to the firing schedule (Appendix 22) to compensate for the extra length of glass by extending the stress annealing hold time in segment 4 from 30 to 60 minutes. The lower voids were closed off and the glass clarity was excellent with a minimum of air bubbles, suggesting a satisfactory firing schedule. I defined the amendment of the firing schedule and the increase in colour intensity as a further technical principle (AL4:52). A third technical principle emerged with regard to the positioning of the top void layer relative to lower void layer. The top void layer could be positioned internally, externally or overlapping the perimeter of the lower void layer. In addition, a top layer void form could meander across more than one lower void form or it could be contained within its perimeter and bisected.

Reflecting on the experience of Experiment 3 and entries into the Aesthetic Log was the defining point of this research. I felt much more at ease with my role as artist/maker relying on past memories of the Seychelles for my inspiration. The role of designer/maker was still there but had been driven into the background by my passion for my inspiration. The role of researcher/maker is evident by my writings and relations with colour theory. In terms of moving my practice forward, my concluding comments were recorded in the Aesthetic Log (AL4:53):

> *I feel so good about what I have done. I want to go back to the Seychelles so I can absorb the atmosphere, paint, sketch and return home full of inspiration for more artworks.*

Experiment 4: Aesthetic Log AL4:54 to AL4:59 – Firing Schedule Appendix 21

Figure 4.10 Topham, S., (2008) ***Experiment 4, Le Jardin du Roi 01*****, 24 cm x 47 cm**

The inspiration for this experiment (Figure 4.10) came again from my fond memories of previous visits to the rainforest and my forthcoming visit to the Seychelles as recorded in the Aesthetic Log (AL4:54). I changed the colours from Experiment 3 for a bit of variation and also I used a different method of manipulating the inclusions into the voids. I placed rather large inclusions and forced them down into the voids. I made the bottom layer voids a lot wider than the top voids with just a little background spacing between them. The top layer voids were a lot thinner and this caused problems when removing the core material and inserting the inclusions (AL4:55). My satisfaction with the piece was recorded in the Aesthetic Log (AL4:56):

> *There's something about this piece that I like. Maybe it's because it's small, compact, highly detailed, I don't know. I love the use of the coloured layers within the voids as they blend together beautifully... Hard to explain but when looking at the inclusions they mould into one another... I really like the general feel of the piece and one which I am very happy with. I found the colours to be a great success. The colours are bright and natural looking. The yellows work well with the lime bright greens. Both these colours blend together beautifully and highlight the flecks of orange that are randomly speckled across the piece. The background colour was changed from a stark crisp ice-white to a vintage cream coloured mountboard. I think this matched the colours within the voids very well especially the dark brown tones.*

There are two aesthetic qualities that can be related back to the matrix and colour theory (AL4:57). Figure 4.11 show the digital separation of the top and bottom void layers. The horizontal inclusion manipulation and the vertical direction of the void forms in the bottom layer create a sense of equilibrium (colour direction). The inclusion colour in the top voids was based around malachite green and lemon yellow. The inclusion manipulation in the lower void layer of dark browns and greens above a vintage cream mountboard contrast with the lighter greens and yellows in the upper void layer (light/dark contrast).

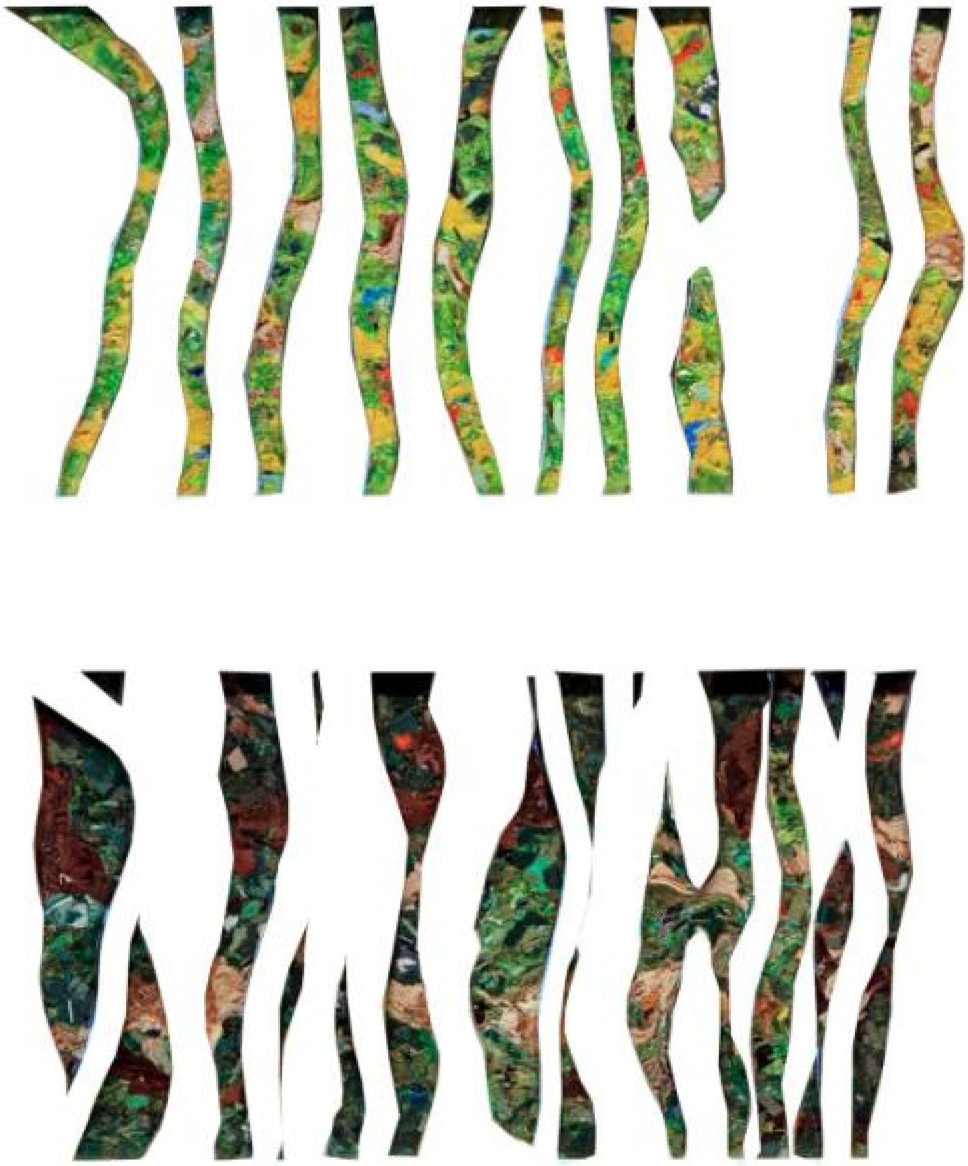

Figure 4.11 Topham, S., (2008) Experiment 4, Digital Separation *in* Aesthetic Log (AL4:57)

The inclusion manipulation created specific boundaries filled with analogous colours large enough to prevent optical mixing at a distance (Figure 4.12).

Figure 4.12 Topham, S., (2008) Experiment 4, Inclusion Boundaries *in* Aesthetic Log (AL4:57)

This experiment used the same firing schedule that was used for Experiment 2 (Appendix 21). No major problems emerged with the glass and the edges required only a light grinding. There were no new technical principles identified with the piece as it had been based on a smaller version of Experiment 3 with the intention of export to the Seychelles.

Reflecting on the experience of Experiment 4 and my entries into the Aesthetic Log, the colour direction and boundary forms within the voids were significant in that they highlighted possibilities for moving my practice forward into a more figurative style of working. However, this piece will remain special to me for two other reasons, firstly the trouble it caused in Customs at Seychelles Airport (AL4:58) and secondly the comments made by Michael Adams (AL5:59):

> *Selina what a beautiful piece of work the preciseness and detail is similar to my work. But it has an added quality, a quality of, yes that's it jewellery it is like a large piece of jewellery that catches and reflects the light.*

I cannot explain in words the feeling I felt when he spoke these words but the effect was a supreme confidence to carry on.

Experiment 5: Aesthetic Log AL4:60 to AL4:64 – Firing Schedule Appendix 21

Figure 4.13 Topham, S., (2008) Experiment 5, Le Jardin du Roi 02, 25 cm x 48 cm

The inspiration for this experiment (Figure 4.13) came whilst painting a banana tree in the rainforest. Earlier that morning I had been in conversation with Adams about positioning and what to look for in the rainforest (AL4:60):

> *It's a bit like that you know, you look at the landscape you absorb yourself in it, you can become a small ant or a lizard or a passing bird and when they fly through the forest they are very fast. You don't see them you just hear them and you remember the silhouette of them as they disappear. So a forest is marvellous. So on that level you can become anything and you can select a brown leaf which has a light coming through it and that's your stained glass window or you can see a piece of fungus which is filled with Malachite, Lapis lazuli beautiful crumbling colours you know, very suckle very Italian in fact.*

Whilst painting in the rainforest you cannot help seeing the green leaves penetrated by the strong sunlight. The colours are so rich and saturated (Figure 4.14).

Figure 4.14 Topham, S., (2008) Sunlight Penetrating Leaves *in* Aesthetic Log (AL4:60)

Adam's reference to stained glass prompted me to use transparent green glass on the base layer (AL4:61). The relative positioning of the voids were different from those used in Experiment 3 and Experiment 4, with some upper voids being placed within the spaces left by the lower voids resulting in a less exposed background. I used the same colour scheme in the bottom layer as I did in Experiment 4 as I felt that the greens and browns work so well and portray the colours of nature perfectly. The inclusions size was quite large and the layering technique was adopted from Experiment 4. The top layer inclusions included fruit netting, plastic labelling and papers, as well as recycled textiles. I continued to use the yellow and bright green theme with sprinklings of orange, and added some hints of blue.

My observations about the artwork were noted in the Aesthetic Log (AL4:62):

> *The colours are amazing so bright and colourful. The green glass background intensifies the colour inclusions within the voids. The orange draws the eye and the lettering on the fruit labels creates a feeling of intrigue. You have a need of wanting to go up to the piece and search within it without knowing what you are actually searching for. From a distance all the colours and the voids merge into one image, very similar to looking at a rainforest. I can make my own patterns from the colours within the void forms. One of my favourites so far I think, just because of the sheer number of things going on within the artwork.*

There were three main aesthetic qualities that linked back to the matrix and the colour theory (AL4:63). The first concerned the inclusion size of orange patches in the top void forms (Figure 4.15) that allowed patterns to be visualised (simultaneous pattern).

Figure 4.15 Topham, S., (2008) Experiment 5, Digital Separation Top Void Layer *in* Aesthetic Log (AL4:63)

The second relates to the inclusion manipulation of the void spacing of the coloured transparent glass which tended to confuse the vertical composition of the artwork (colour direction). The third relates to the void spacing of the coloured transparent glass and the inclusion size creating an aesthetic quality whereby the artwork was experienced as a whole as shown in Figure 4.16 (optical colour mixing).

Figure 4.16 Topham, S., (2008) Experiment 5, Effects of Green Glass Base *in* Aesthetic Log (AL4:63)

Technically the firing schedule I used for the experiment was the same as the one I used for Experiment 4 (Appendix 21), with transparent green glass replacing the bottom base layer. No adverse effects were recorded and only slight grinding of the edges was required for a perfect frame fit. I identified two new technical principles (AL4:64) as a result of the inclusion of the transparent glass regarding the firing schedule and optical mixing.

Reflecting on the experience and my Aesthetic Log notes, Experiment 5 was significant. It had got me back in touch with nature and I felt really good about working this way. Whilst painting in the rainforest I did not see ‘this image’ or ‘that plane’, I just saw a mass of colour in front of me. This wholeness also seems to be expressed in the work, which creates a dilemma in terms of the composition sought, wholeness or separation. The previous experiments did not have this wholeness, which leads me to assume that it is due to the coloured glass, a factor that needs further investigation.

Experiment 6: Aesthetic Log AL4:65 to AL4:70 – Firing Schedule Appendix 21

Figure 4.17 Topham. S., (2008)
Experiment 6, Plastic Bag Eco,
48 cm x 25 cm

The inspiration for this experiment (Figure 4.17) was a combination of three thoughts: (1) the ocean around the Seychelles, (2) making a statement, and (3) exploring transparent coloured glass further (AL4:65). The void forms were cut organically and some were fork-shaped to represent the joining waves of the sea. The inclusions were plastic shopping bags from everyday supermarkets placed strategically within the glass voids to show their wording and symbols, which I had pre-planned by sketching out their locations (AL4:66) as shown in Figure 4.18.

Figure 4.18 Topham, S., (2008) Experiment 6, Sketch of Text Positions *in* Aesthetic Log (AL4:66)

It was extremely difficult to place the text correctly within the voids without the plastic creasing and folding so that it was legible (AL4:67).

My observations of the finished piece were recorded in the Aesthetic Log (AL4:68):

> *I love this idea. Just little snippets of text from the plastic bags 'please re-use me' showing through the glass, just how I imagined. More than happy with this one but the beech wood frame is too heavy I think. The plastic bags are a brilliant inclusion they mould to the void forms perfectly, no unsightly gaps or spaces within the glass at all. I chose a transparent blue colour for the background glass. Not much of the background showed through unlike some of the previous experiments however what spacing was left from the voids complemented the inclusions very well. The blue created a bright and refreshing contrast with the white inclusions. A very successful piece, fresh, crisp and clean looking that has an obvious hidden message. Once again there is a wholeness about the artwork.*

The first link back to the matrix and the colour theory (AL4:69) was the red/orange, blue and green inclusion types (Figure 3.6) within the void forms creating a split complementary colour scheme (colour harmony). The manipulation of the inclusion printed text within the void forms cause the eyes to follow the text across the artwork and induces closer inspection of the artwork as shown in Figure 4.19 (colour direction).

Figure 4.19 Topham, S., (2008) Experiment 5, Text Colour Direction *in* Aesthetic Log (AL4:69)

There is a contrast between the transparent blue glass void spacing and the mainly white plastic inclusion type (light/dark contrast). Very little background void spacing was used as shown in the digital separation of the background (Figure 4.20).

Figure 4.20 Topham, S., (2008) Experiment 5, Digital Separation Base Layer *in* Aesthetic Log (AL4:69)

The colour of the base layer inclusion type (blue transparent glass) which represented the void spacing was enhanced due to the layer of clear glass fused on top of it (transparency and colour).

Upon reflection on the experience of Experiment 6 and my notes in the Aesthetic Log, I was still puzzled by the use of coloured glass in the artwork. Experiment 5 had created wholeness, thought to be a result of the coloured glass base layer and the upper void layer with similar colours. In this experiment, there was a clear and definable colour contrast between the transparent coloured base layer and the upper layers, yet this had also resulted in wholeness. I decided to review some preliminary experiments carried out in 2008 to establish the effects of transparent glass at different positions within the glass layers to see what aesthetic qualities resulted (AL4:70). It was found that optical mixing due to colour spread did not occur when the coloured glass was in the base layer but did occur when positioned in layers two and three.

The glass was fused and slumped using the same firing schedule as for Experiment 2 (Appendix 21). The edges of the top voids were within tolerance but required grinding to fit the frame, suggesting that the different specification for the coloured glass had not affected the firing schedule. I identified new technical principles (AL4:71) regarding the impact of small amounts of coloured glass, optical mixing and colour spread.

My reflections also gave rise to the question that if transparent coloured glass resulted in specific effects, what would be the aesthetic qualities generated by opaque glass? Furthermore, the use of text within the artwork had the potential for corporate work should I wish to take my practice down that route.

Experiment 7: Aesthetic Log AL4:72 to AL4:76 – Firing Schedule Appendix 21

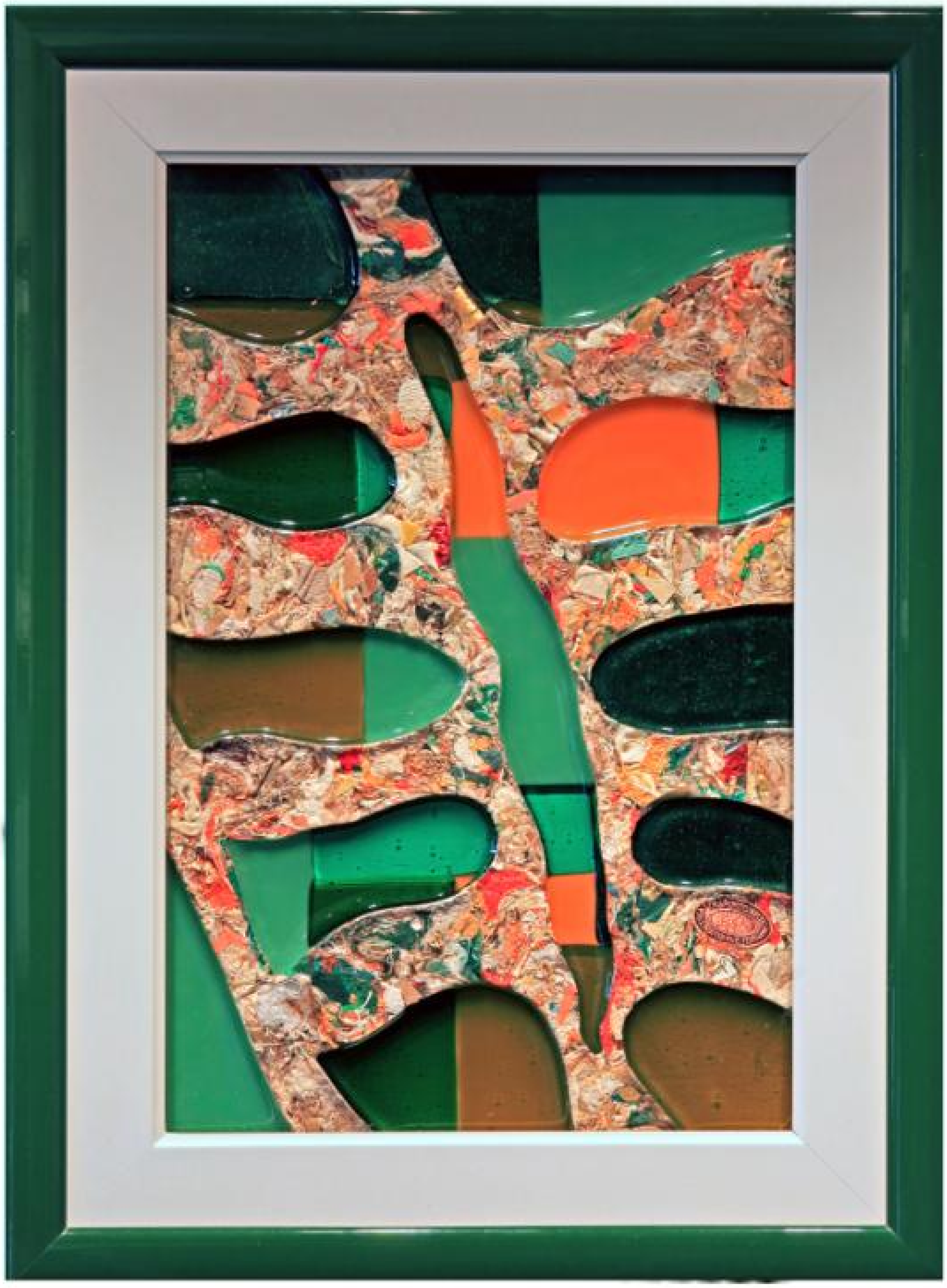

Figure 4.21 Topham, S., (2008)
Experiment 7,
Decaying Leaf,
36 cm x 24 cm

The visual inspiration for this piece came from my observation of decaying leaves with sections missing from them in the rainforest (Figure 4.22) and the need to explore the use of opaque coloured glass within my work (AL4:72).

Figure 4.22 Topham, S., (2008) Decaying Leaves in Rainforest *in* Aesthetic Log (AL4:72)

I found some opaque glass colours that related to the natural green and brown colours in the rainforest, but naturally did not represent a perfect match due to the limited number of colours supplied by the glass manufacturer. The pieces were cut, placed in the kiln and fused using a standard firing schedule. A single void shape was cut from fibreboard and placed on the fused coloured glass and a clear layer was placed on top before being fused for a second time using the firing schedule in Appendix 21. The fibreboard was then removed and the inclusions inserted (AL4:73).

My observations concerning the artwork were recorded in the Aesthetic Log (AL4:74):

> *The void layer gives such a good aesthetic effect. However what I did not like was the relationship between the void layer and the coloured glass background. The coloured glass pieces were not the correct colours for the theme. The colours are too bold and do not feel natural at all, unlike the inclusions themselves. Also the blended lines of the coloured shapes are dreadful as they interfere with the natural organic lines of the voided area. The background completely separates from the upper layer to create two distinct planes. I would think that this piece would have looked a lot better if*

the background colour was a single colour, maybe the same transparent green colour as in experiment five? The success of this piece is the inclusions which represented the burnt faded crispness of the leaf really well, and the use of sawdust added a touch of reality to the artwork and caused the inclusions to optically mix at a distance.

In terms of linking back to the matrix and colour theory, the void spacing and the inclusion type creates two distinct planes within the artwork (light/dark contrast). The digital separation (Figure 4.23) shows how each layer tends to appear as a single entity, reinforcing the planes within the artwork.

Figure 4.23 Topham, S., (2008) Experiment 7, Digital Separation *in* Aesthetic Log (AL4:75)

The finely chopped inclusion size (Figure 4.24) in the upper void layer causes the colour boundaries to blend at a relatively near distance (optical colour mixing). The colouring of the inclusion type in the upper layer is in harmony with lower void layers (colour harmony) but a precise match was not available due to the different mediums used and the restricted colour palette of the glass (AL4:75).

Figure 4.24 Topham, S., (2008) Experiment 7, Inclusion Types *in* Aesthetic Log (AL4:75)

There were no technical difficulties with the piece and firing schedule (Appendix 21) was used to fuse and slump the work. I identified two technical principles, the first concerning the use of straight-edged opaque coloured glass and the second concerning the use of single voided forms enhancing the planes within the artwork (AL4:76).

Reflecting on my experience and entries into the Aesthetic Log, the finding relating to the enhancement of the planes within the artwork might be useful in future work. I was not happy with the use of opaque glass within my artwork. I prefer the main colour to come from the inclusions within the voids.

Experiment 8: Aesthetic Log AL4:77 to AL4:82 – Firing Schedule Appendix 21

Figure 4.25 Topham, S., (2008)
Experiment 8, Island Fringe,
38 cm x 25 cm

My main inspiration for this piece came from looking out from the aircraft window as I approached the island, recognising the differences in the colours of the sea as it merged with the beach (AL4:77), and the need to explore **coloured frit** (crushed glass) within my artwork. Coloured frit allowed me to blend colours together onto the background of a clear sheet of glass. I sprinkled the frit diagonally (AL4:78) to create an effect, when fused, of the blue and green colours of the sea and sandy colours of the beach (Figure 4.26).

Figure 4.26 Topham, S., (2008) Experiment 8, Crushed Coloured Glass *in* Aesthetic Log (AL4:78)

Void strips were placed diagonally across the frit and a layer of clear glass was placed on top (AL4:79), and this was fused and slumped using the firing schedule in Appendix 21. The inclusions consisted of finely chopped flotsam, sand and dead coral collected from the beach.

My observations for the experiment were recorded in the Aesthetic Log (AL4:80):

> *I am not impressed with the overall look or feel of this piece. Ideally this piece would have worked much better if correct colours were obtainable. It seems you can buy either dark blue, medium blue or light blue but nothing in between. There is no subtleness between the colours. Even when blended together the colours appeared to be quite blotchy. Maybe a fine powder would have worked better? The frit was supposed to act as a background but because of its transparency and blotchiness it added discord to the artwork. I used natural inclusions to represent the beach, however the coral did not manipulate well within the void forms and left spaces which I tried filling with sand. I also noticed an imbalance between the vibrancy of coloured frit and the inclusions within the voids resulting in a further discord. I have to admit these inclusions did nothing for me. This experiment did not work at all.*

In terms of linking back to the matrix and colour theory before firing, the inclusions within the void spacing had a degree of colour harmony, especially the analogous blues, but this turned to discord once fused and slumped. The manipulation of the inclusions in the diagonal void layer induced the eyes to move across the artwork (colour direction) (AL4:81).

I identified several technical principles with this experiment (AL4:82). The firing schedule I used in fusing and slumping double void layers required no amendment. The intensity of coloured frit created a significant discord with the inclusions. The use of a clear glass boarder caused further discord when framed.

Reflecting on the experiment and the notes in my Aesthetic Log, whilst the outcomes were not satisfactory, significant learning did take place. Opaque and coloured frit had both resulted in disappointing outcomes, which tended to refocus my thoughts back to my original intentions.

Experiment 9: Aesthetic Log AL4:83 to AL4:87 – Firing Schedule Appendix 21

Figure 4.27 Topham, S., (2008)
Experiment 9, Bamboo,
23 cm x 35 cm

The inspiration for this experiment came from observing bamboo growing in a garden at the highest altitude on the Island (AL4:83) and my intention to return to providing colour through the use of recycled inclusions rather than coloured glass. I created an initial composition with void forms with plenty of space so that I could manipulate the inclusions (Figure 4.28). I was aware that the use of large void forms within the trapunto fabrication technique, according to the findings of Van den Burghr[36], created problems. Too much added material would cause the void to bulk, too little would cause the material to move around.

[36] See literature review Chapter Two (p25).

Figure 4.28 Topham, S., (2008) Experiment 9, Initial Composition *in* Aesthetic Log (AL4:84)

My expectations for Experiment 9 were that large void areas could be filled with inclusion colour that would create an image within the voids. The artwork was prepared and comprised of three layers of glass and two layers of fibreboard to give two void layers (AL4:85), and was fused and slumped using firing schedule as shown in Appendix 21.

My observations of the glass once it had been fired were recorded in the Aesthetic Log (AL4:86):

> *Blimey, the top layer is so thin if I try and stuff this it will just break... The lower voids have not closed off... It is as though the piece has hardly been fired... I just can't use this...*

The outcomes of the experiment were unsatisfactory because of two technical problems (AL4:87) associated with the use of large surface area voids. The first problem arose because the top temperature of the firing schedule on the large surface area of the void material resulted in an increased **viscosity** of the glass. This increase in viscosity resulted in a gravitational flow away from the top layer of the glass, causing a very thin layer of glass across the large expanse of the upper void area. If inclusions were to have been inserted into these large void areas, the glass would have cracked due to the internal pressure caused by the insertion process. Secondly, the insulation properties of the large surface area of void material prevented heat from fusing the bottom layer. This resulted in the lower voids not being closed off properly and would have interfered with the separation of inclusion colours.

Reflecting on the experiment and notes from the Aesthetic Log, these unfortunate outcomes were due to an incorrect firing schedule. I find it intriguing that Van den Burghr's reference to bulking in trapunto should manifest in breakage of the glass, indicating that whilst the layer materials are different, the same principles apply. However, my anxiety was increasing as to whether large void areas could ever be used within my work. I decided to embark on a series of experiments which concentrated on void forms and areas.

Experiment 10: Aesthetic Log AL4:88 to AL4:97 – Firing Schedule Appendix 23

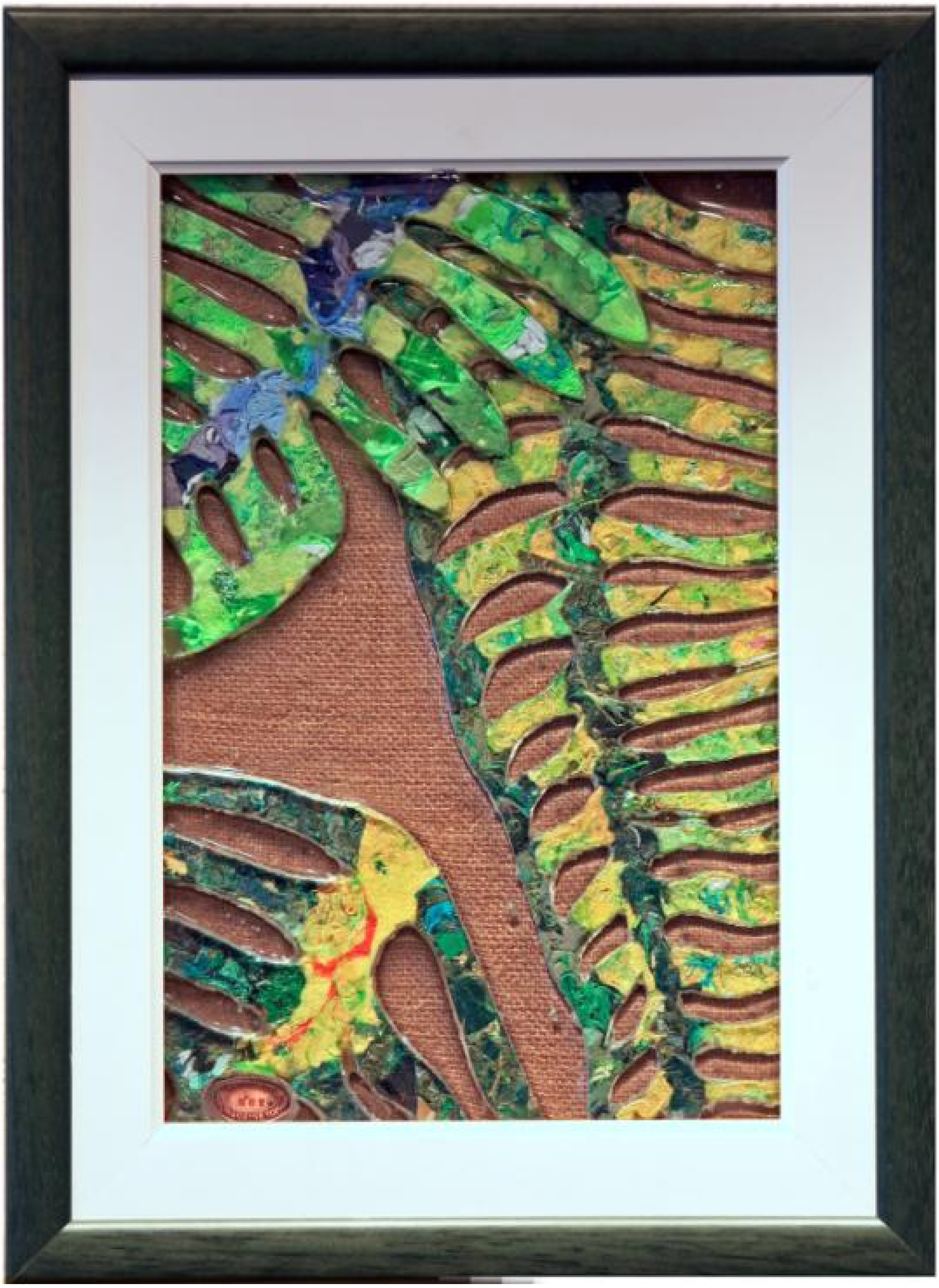

Figure 4.29 Topham, S., (2008)
Experiment 10,
Coconut Palm Leaf,
34 cm x 23 cm

My inspiration for this piece came from a painting of a coconut palm leaf on a beach in the Seychelles (AL4:88) and the need to experiment with void forms and colour. I translated the painting into a sketch of the void forms but found I had to modify it to gain access for the lower void layer (AL4:89) and the upper void layer (AL4:90). The need for planning access was one of Van den Burghr's research findings mentioned in Chapter Two. I then translated these sketches into an initial composition (AL4:91). The artwork was prepared and heated using the amended firing schedule as shown in Appendix 23 with an extra 20 minutes added to the hold time of segment 1a to allow for the full escape of gases because of the added complexity of the void forms of both layers. The removal of the fibreboard was difficult due to the complex void forms, however when complete the void forms were clearly defined (AL4:92). The inclusions consisted of finely chopped silk fibres and were matched according to the colour scheme in the original composition, with brown hessian being used for the background (AL4:93).

My observations of the experiment regarding the aesthetic qualities were recorded in the Aesthetic Log (AL4:94):

> *Quite an exciting piece... The final appearance is very attractive. The hessian background works very well... the glass magnifies the weave. The colour of the hessian contrasted well with the inclusion colours. The blending of silk fibres is excellent, they give the artwork a painterly quality. The colours seem to give the artwork a warm feeling. There is something wrong with these inner void edges they look awfully rough... Overall very pleasing to look at.*

The poor internal void edges had identified a new technical principle due to the angle of the knife not been perpendicular to the fibreboard when cutting (AL4:95). However, the success of the artwork was the way that the silk fibres had blended together, as shown in the digital separation (Figure 4.30).

Figure 4.30 Topham, S., (2008) Experiment 10, Digital Separation showing blending of Silk Fibres *in* Aesthetic Log (AL4:96)

This artwork links back to the matrix and colour theory in several ways (AL4:97). The first is the analogous colour scheme of the yellows and greens of the inclusion types within the void forms (colour harmony). The blue and yellow inclusion types in the upper and lower voids layers recede and advance (cold/warm contrast). There is a sense of positive and negative caused by the lighter inclusion types within the void forms and the darker brown hessian background (light/dark contrast). The diagonal positioning of the upper and lower void layers combined with the inclusion manipulation induce the eyes to automatically follow (colour direction). Finally the fine inclusion size blended at near distance within the void form (optical colour mixing).

Reflecting on my experience of the experiment and the notes contained within the Aesthetic Log, I became much more at ease with the use of colour within the voids, mainly due to the blending effect of the fine inclusion size. Experiment 4 had resulted in manipulation that resembled a form of layering within the voids due to large inclusion sizes. Experiment 8 has resulted in gaps within the voids due to the inclusion type. However, this experiment had resulted in a blending of a painterly quality due to the fine inclusion size, inclusion type and method of manipulation, which was significant in terms of moving my practice forward.

Experiment 11: Aesthetic Log AL4:98 to AL4:102 – Firing Schedule Appendix 23

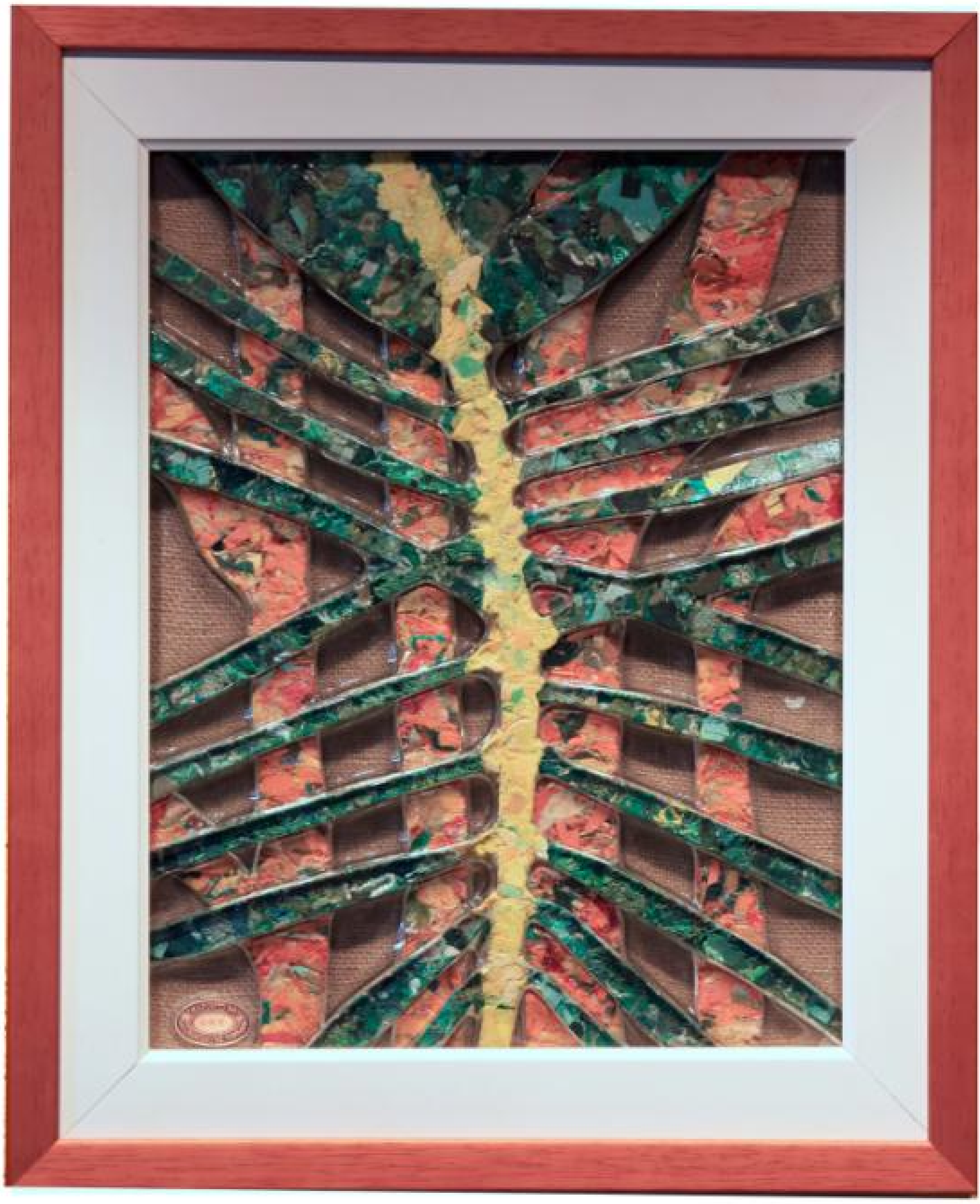

Figure 4.31 Topham, S., (2008)
Experiment 11,
Palm Leaf and Rainforest
35 cm x 27 cm

My inspiration for this experiment came whilst taking photographs of different palm leaves within the botanical gardens during my stay in the Seychelles (AL4:98), and the need to continue my exploration of void forms in relationship to my artwork.

My observations of the finished artwork were recorded in the Aesthetic Log (AL4:99):

> *This is a very complex piece of void fusing and slumping. Interestingly I can see the clear distinction between the top and bottom layer planes... The colours within the voids on the bottom layer are darker than those of the upper void layer resulting in a high degree of colour contrast... It's like having two distinct images within one piece of artwork. The leaf and tree like void shapes combined with the natural colours give a high degree of realism to the artwork... The hessian background adds to this... My first thoughts are that the void shapes and colours cause too much of a separation but on reflection this is how it actually looks in the rainforest... The more I look at it the more I feel like I am in the rainforest... There is something about this piece that makes it unique maybe it is the opposing directions of the voids, my eyes get draw into it, or maybe the shadiness like some parts of the rainforest.*

Figure 4.32 Topham, S., (2008) Experiment 11,
Digital Separation *in* Aesthetic Log (AL4:100)

In terms of linking back to the matrix and colour theory (AL4:101), Figure 4.32 shows the digital separation of the three layers and the contrast between the inclusion types of the brown base layer and the orange of the first void layer resulting in the separation of planes (light/dark contrast). There is also a strong contrast between the green inclusion type of the leaves and the yellow of the midrib in the upper void form (light/dark contrast). The combination of the horizontal and vertical coloured inclusion manipulations and void layers creates a sense of depth, as shown in Figure 4.33 (colour direction).

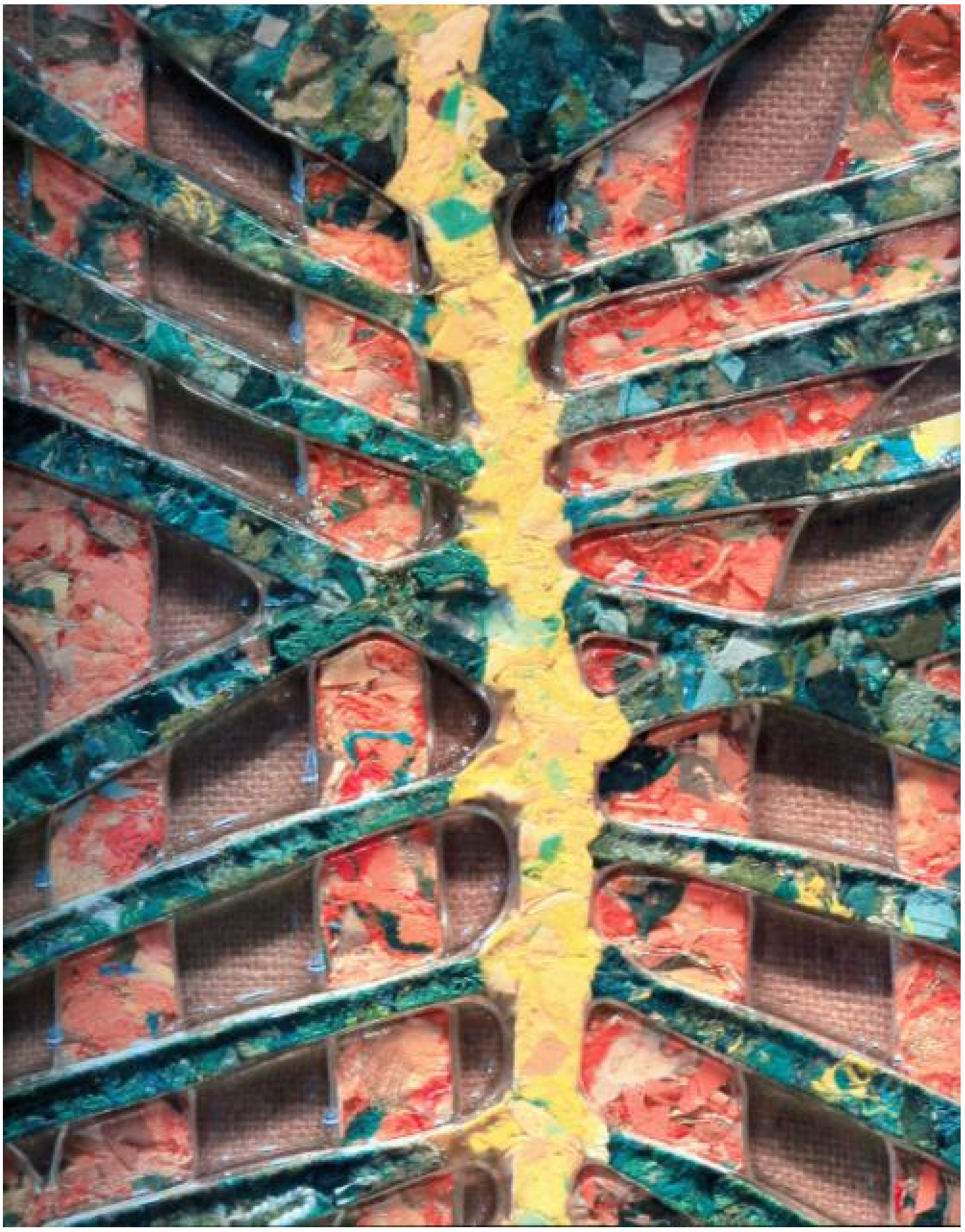

Figure 4.33 Topham, S., (2008) Experiment 11,
Sense of Depth *in* Aesthetic Log (AL4:101)

Technically the outcome of the experiment resulted in a very complex set of voids and non-void shapes. The firing schedule used was the same as that used in Experiment 10 (Appendix 23). The fusing was near perfect with the exception of one small area which did not slump down, leading to a new technical principle being entered into the Aesthetic Log (AL4:102).

Reflecting on the experiment and the Aesthetic Log notes I think the total experience was significant in that a synergy existed between the roles of artist/maker and designer/maker during inspiration and creating the initial composition (AL4:98). The near-perfect fuse of such a complex void structure also gave me a great deal of confidence in terms of my glass-making skills.

Experiment 12: Aesthetic Log (AL4:103 to AL4:106) – Firing Schedule Appendix 23

Figure 4.34 Topham, S., (2008)
Experiment 12,
Banana Plant
35 cm x 27 cm

My inspiration for this experiment came from a banana plant and the need to explore the void layers as two separate images (AL4:103). My observations of the finished artwork were recorded in the Aesthetic Log (AL4:104):

> *This is an absolutely stunning piece. The vibrancy of the inclusions I had placed in the banana plant voids contrasted beautifully with the brown mixture of the tree voids behind. I love the incorporation of the blues, purples and green inclusions mixed in with the browns, and the way I have layered the one colour over another to produce a natural looking pattern within the tree. For me, the highlight in this piece has to be the gold metallic threads I have used amongst the other inclusions, they bring the piece to life with their reflected sparkle... this piece stands out from the other experiments. I also like the shadows at the edges of the void forms and how the artwork reflects the light in general. The colours look much brighter than they really are. I love the Seybrew bottle top in the work it gives me a sense of nostalgia about just being there... I forgot how powerful the colour white can be, using it as the background represents the crispness of light... this crispness reminds me of the Caribbean rather than the Seychelles.*

Figure 4.35 Topham, S., (2008) Experiment 12, Enhanced Colour *in* Aesthetic Log (4:105)

In terms of linking back to the matrix and colour theory (AL4:105), Figure 4.35 shows the enhanced colour of the inclusion types within the void forms (transparency and colour). There is a contrast between the yellow, green and red inclusion types in the upper void form (contrast of hue) resulting in an increased vibrancy of colour and a decided effect (saturation contrast). There is a contrast between the browns, purples, blues and gold inclusion types in the lower void layers with the yellow and green in the upper void layer resulting in two distinct planes (light/dark contrast). The metallic gold thread inclusion type in the lower void form varied the angle of reflection, which created a sparkling effect (reflection and colour). The diagonals of the lower void layers and the inclusion manipulation draws the eye to the centre of the artwork (colour direction).

I identified two new technical principles (AL4:106), the first being that larger void areas up to a maximum of 75 cm^2 did not produce thin layers of glass using the firing schedule (Appendix 21) as was the case in Experiment 9. The second was that any inclusion type such as the Seybrew bottle top could be inserted into the glass voids provided it did not exceed 4 mm in depth and fitted within the void width.

Reflecting on the experience of the experiment and the notes in my Aesthetic Log, I began to realise that what had made things easier in the last three experiments was the translation of the inspiration into two images and then superimposing one on top of the other. This process was a lot easier than thinking in terms of the composition as a whole but led to distinct planes within the artwork and a clinical crispness if a white background was used under the void spacing. Although the artwork was extremely pleasing there was a tension as to whether this process oversimplified the work.

Summary: Chapter Four

The experience of my first 12 experiments resulted in four transitory phases for my practice. Experiments 1 to 2 were an anxious period where I was trying to understand the relationship between artist/maker and designer/maker roles and the processes that I used to translate my inspiration into my practice – an anxiety made worse by the technical challenges that I had not anticipated. In all, it was a period where my confidence was at an all-time low and success seemed a long way off.

Experiment 3 was the turning point in the research, where for the first time I could see the potential that the technique had for producing unique and beautiful artworks. The technical principle associated with the twisting of the fibre strips and the effect it had on colour and reflection led to a new dimension within my practice.

Travelling to the Seychelles and talking with Michael Adams confirmed that I was on the right track, and gave me a much-needed break from the confines of the kiln shed and the freezing soaking of the grinding process. During my visit I was able to observe the relationships between colours on the island during different weather conditions and at certain times of the day. This helped me refine my colour palette and observe how light could be used to enhance my work.

Experiments 5 to 8 concerned the use of coloured glass within my artworks. A number of significant findings emerged. First was how coloured glass affected the composition in terms of wholeness and separated planes. Transparent sheet glass in the base layer tended to merge the components of the artwork into a whole. Crushed glass frit, on the other hand tended, to enhance separation within the artwork. The positioning of the coloured glass within the layers also had an effect on the colour spread within the artwork. I discovered that colour spread occurred in layers 2 and 3 but did not occur in the base layer. These findings suggest that coloured transparent sheet glass as a base layer offered limited potential for use within my artworks because of its restricted colour palette, and confirmed that the main colorants should be from the recycled inclusions rather than the glass. The four experiments also allayed my anxiety of having to defend why stained glass was not central to this research.

Experiments 9 to 11 concentrated on complex void formations to create figurative images from void forms, layering and spacing. I discovered that the insulation properties of fibreboard contained within large void areas created problems during fusing and slumping. I also discovered that the void spacing was critical in terms of allowing the glass to slump down to the lower layers. There was a drift away from the artistic towards the technical in these experiments, resulting in a clear separation of images between the upper and lower layers. However the success in Experiment 10 and Experiment 11 gave me much confidence in my technical abilities to create complex voided structures within glass.

Experiment 12 revealed the significance of colour and inclusion type. The use of gold coloured threads and purple combined exceptionally well to add a degree of opulence to the artwork when illuminated under the gallery lighting. The yellow silk fibres manipulated through felting created a blending of painterly quality. The inclusion of a beer bottle top added a sense of realism and nostalgia to the artwork. Finally, the inclusion of the ice-white mountboard under the glass void spacing gave the artwork a sense of crispness and a professional finish that is normally associated with glass.

The technical learning curve has been steep, and looking back on the notes in the Aesthetic Log of the problems I encountered in the first two experiments some 12 months earlier demonstrated how my practice had moved forward. My technical learning was captured as a series of 27 principles (Appendix 24), which I used as a foundation for further experimentation.

In terms of the linking back to colour theory the experiments confirmed 24 of the 42 anticipated unique aesthetic qualities identified in Appendix 12. Figure 4.36, shows the frequency of each aesthetic quality where it was considered to be significant to the artwork, the full account of which can be found in Appendix 25.

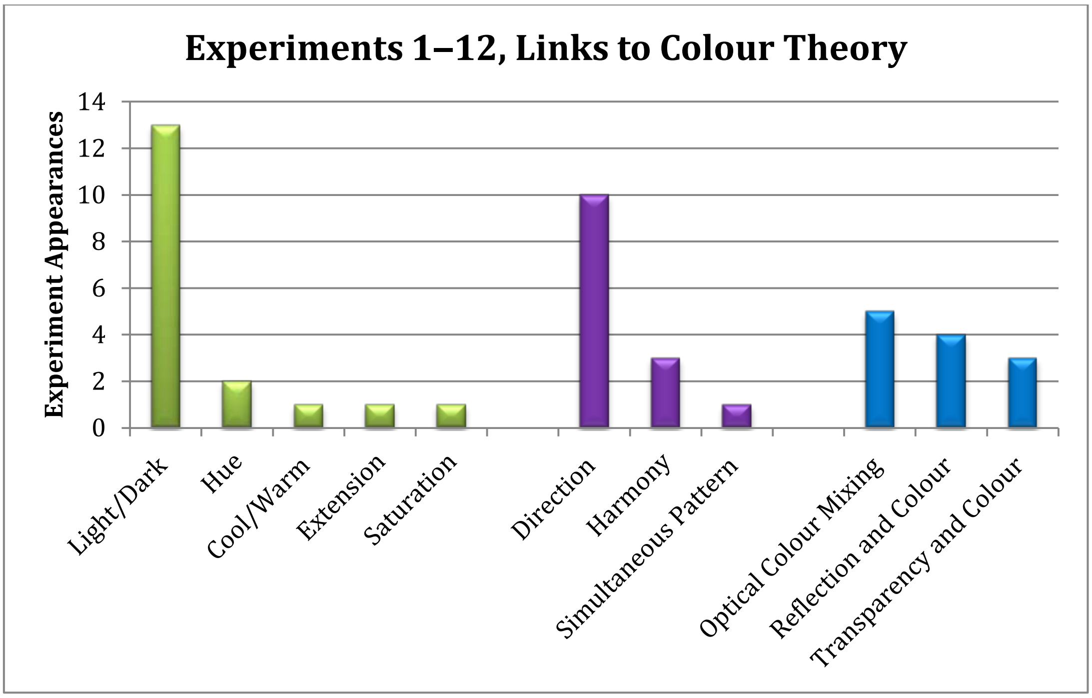

Figure 4.36 Topham, S., (2013) Experiments 1–12, Links to Colour Theory [Graph]

Figure 4.36 shows that light/dark was the most significant contrast in my artworks, appearing across all void and inclusion categories within the matrix. Colour composition was influenced mainly by colour direction both by the inclusion manipulation and the void forms. Colour optics was more balanced, with optical colour mixing associated with void form, inclusion size and manipulation being the most identifiable by a small margin.

I also discovered links back to my findings on core forming and trapunto in terms of the ancient difficulties associated with core forming, such as core removal and Van den Burghr's guidelines on trapunto regarding stuffing large voided areas and the planning access.

My Aesthetic Log and Dewey's experimental learning model (Figure 4.1) confirmed my role of artist/researcher when the findings of the technical principles, colour theory, core forming and trapunto were combined with the experimentation. By the time I had arrived at Experiment 12, I felt confident with myself and with moving my practice forward to work on a larger scale. However, Experiment 12 had reminded me of the different light in the Caribbean and the potential for me to create artworks with even more vivid colour than the Seychelles. Furthermore, the Caribbean represented a break from the art of the Seychelles and in particular Michael Adams – a sense of 'going it alone' that I felt would be good for me and my practice.

Chapter Five

Large Glass Experiments

Introduction

This chapter explores six large glass experiments (over 2,000 cm^2) and continues to expand on the technical set of principles and relationships to colour theory identified in the previous chapter. Glass size is a critical factor in determining the firing schedule in fused and slumped glass generally. Larger-sized glass requires the insertion of more fibreboard, which further complicates the firing curve of the firing schedule. In addition, the increased mass of fibreboard makes it more difficult and time-consuming to remove and to place the inclusions. The physical handling of the glass becomes more difficult because of the larger size and weight. A timeline for the large glass experiments is shown in Appendix 26.

The themes for the six experiments are based on a visit to the island of Barbados in the Caribbean because of its crispness of light, vibrant colours and my previous memories (AL5:1):

> *Crispness of light and vibrant colour, yes that has got to be the Caribbean, but which island?... Barbados, short flight no interchanges, I know the island quite well... Last time I stayed at the Cobblers Cove Hotel in St. Peter district... I remember a man in a straw hat sitting in the grounds close to the pool painting a watercolour of the sea and overhanging palms... I just knew then one day that I would return and it would be me sitting there... The blue sea, the amazing sunsets, the brightly coloured chattels, the fun atmosphere... absolutely perfect.*

Experiment 13: Aesthetic Log AL5:1 to AL5:13 – Firing Schedule Appendix 27

Figure 5.1 Topham, S., (2009)
Experiment 13,
Caribbean Sunset,
76 cm x 28 cm

My inspiration for this piece came from watching the beautiful, but very quick, sunset over the sea (AL5:2), which I translated into a two-layer composition for my artwork (Figure 5.2).

Figure 5.2 Topham, S., (2009) Experiment 13, Initial Composition *in* Aesthetic Log (AL5:2)

I considered the composition very carefully, reflecting both on my quick painting and my memories of the sunset the night before (AL5:3):

> *I want the dominant feature of this artwork to be the image within the inclusions rather than glass void forms. I will use three layers of glass with two voided layers with a combination of narrow and wide sections spaced unevenly across the top and bottom layers of the piece. I want the upper void*

layers to eclipse the lower ones but I don't want them to twist. My memory of the sunset is one of a kind of flatness, it's like watching a panoramic view in the cinema but on a much larger scale... there is an evenness of colour and no harsh reflections... pure tranquillity. I want only a slight exposure to the background so I have maximum void area to add and manipulate the inclusions.

The fibreboard strips were cut and placed carefully to avoid twisting during firing. Amendments were made to the firing schedule (Appendix 27) to prevent unwanted reflection angles flattening the top layer (AL5:4). It was found that the removal of the void material after firing was time consuming because of the large quantity used (AL5:5).

I was concerned about the precise placement of the inclusions in this piece as they were critical to the outcome of this artwork. I finally decided on drawing temporary outlines onto the surface of the fused glass to act as a guide (AL5:6). I used hand-dyed silk fibres and yarns for the majority of the inclusions, very finely chopped to facilitate blending and the formation of the figurative image based on a colour palette of reds, yellows, oranges, purples and blues. I devised a method of steaming the fibres to enhance their colour (AL5:7). In addition, I used small amounts of printed cotton, sweet wrappers, plastic labels and yarns to add interest. Whilst the images on the outer surface provided guidelines, the accurate positioning of the inclusions within the voids still remained a concern. I devised a technique of using bamboo sticks to act as temporary dams to manipulate and accurately position the inclusions. Once complete, the artwork was supported with an internal natural-coloured wooden inner frame and a hand-coloured wooden outer frame that was held together by means of a new fastener (AL5:8). The weight of the artwork required it to be hung using heavy-duty hangers (AL5:9).

My observations of the finished artwork were recorded in the Aesthetic Log (AL5:10):

> *This sunset is absolutely stunning… reminds me of sitting by the beach bar painting and capturing the sun as it is just going down. I love the vibrancy of the colours... made even more so by the transparency of the glass… definitely makes me feel warm. The blue contrasts well with the red and yellow… I like how the inclusions blend seamlessly into one another and manipulate themselves within the voided form. I think the lights make the piece look soft with the textile inclusions. I like the void forms that cause the eyes to drift around the artwork before settling in the centre... I like how it is less simplistic than the earlier experiments... it reminds me more of a painting... The white void spaces increase the brightness of the colours.*

Figure 5.3 shows the blending and manipulation of the inclusions within the voided form.

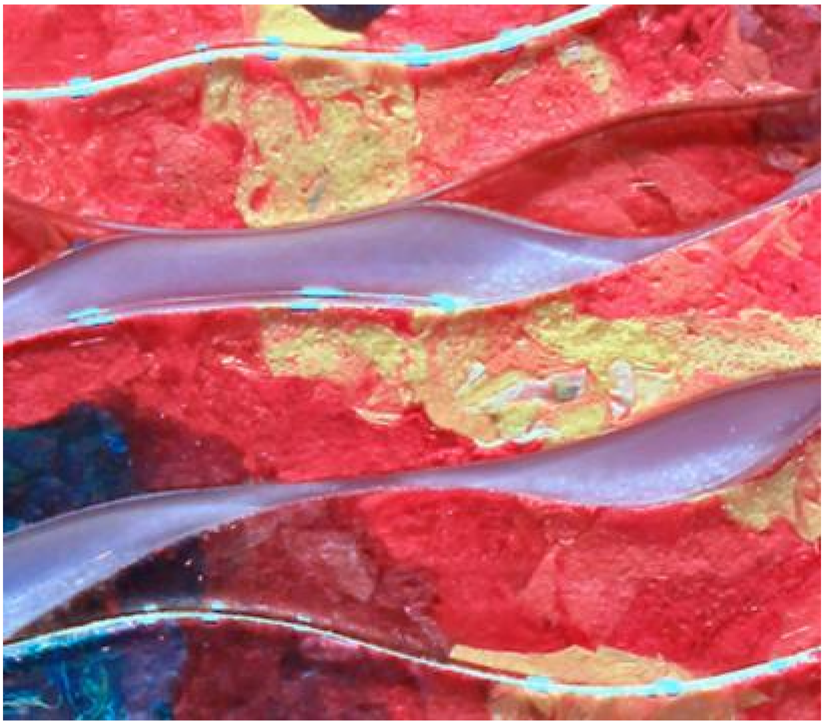

Figure 5.3 Topham, S., (2009) Experiment 13, Inclusion Blending and Manipulation *in* Aesthetic Log (AL5:10)

There are several links back to the matrix and colour theory with this artwork (AL5:11). A contrast is noticeable between the silk fibre inclusion types inside the voided forms resulting in a vibrancy of colour (saturation contrast). The transparency of the glass void forms added to the vibrancy of the inclusion types (transparency and colour). The inclusion types comprising of red, yellow and blue create a triadic colour scheme within the void forms (colour harmony). This variance in inclusion type colour also creates a contrast across each void layer and between void layers (hue contrast). The red and yellow inclusion types advance whilst the blue recedes and is enhanced by the void layering (cold/warm contrast). There is a contrast between the yellow and blue inclusion type in the upper and lower void layers that creates a sense of wholeness (light/dark contrast). The fine inclusion size of the silk fibres within each void form creates a blending which eliminates the colour boundaries at very close distance (optical colour mixing). The vertical, horizontal and circular inclusion manipulations within the void forms induce a variety of eye movements (colour direction).

I used several technical principles that I had identified in experiments 1 to 12 to develop the voided glass for the experiment (AL5:12). The amendment of the firing schedule was successful in producing a flatter top surface, resulting in a new technical principle (AL5:13). The top void edges were well within the tolerance for grinding and the lower voids were perfectly formed, suggesting a satisfactory firing schedule for this glass size with a surface area of 2,128 cm^2.

Reflecting on my satisfying experience and the Aesthetic Log notes of this experiment, I felt a level of maturity had been reached working with the roles of artist/maker, designer/maker and researcher/maker. In particular, this artwork was less directly figurative than the earlier experiments and not so simplistic, and made the separation between glass voids and inclusions seen in the previous experiments disappear.

Experiment 14: Aesthetic Log AL5:14 to AL5:25 – Firing Schedule Appendix 29

Figure 5.4 Topham, S., (2009) Experiment 14, St Peter District, 50 cm x 75 cm

My inspiration for this piece came from the district of St Peter in Barbados, which is littered with brightly coloured chattels and beautiful planted gardens, as well as the need to create an artwork of maximum size (AL5:14). I translated my sketches and photographs into an initial composition, prepared the glass, then fused and slumped it according to the amended firing schedule shown in Appendix 28 (AL5:15). I made an entry into my Aesthetic Log about what followed (AL5:16).

> *The firing schedule is complete, programmer reads 40°C quite excited really I will now open the kiln... the glass looks normal. I will close the kiln and leave the work until I need it. Today (06:04:2009) I opened the kiln again... Oh no the glass is cracked right across the top right quadrant through all three layers. So upsetting what a waste of time, effort and money... I thought things were going so well. What on earth has happened... It was fine a few days ago... but now it has cracked.*

Figure 5.5 shows the experiment with the top right quadrant removed to demonstrate the severity of the damage.

Figure 5.5 Topham, S., (2009) Experiment 14, Broken Top Quadrant *in* Aesthetic Log (AL5:16)

I analysed the problems and concluded that the crack was due to improper annealing and bad void positioning (AL5:17). The implication of this breakage was significant for my practice and caused me considerable anxiety. A build-up of stress within the glass had caused it to break after it had been fired. Should this have happened when hung in a gallery, possible injury could have been caused to the viewer. I therefore decided to invest in a stressometer.

I produced a second composition based on the original sketches and photographs but reduced the complexity of the top void layer (Figure 5.6).

Figure 5.6 Topham, S., (2009) Experiment 14, Composition 2 *in* Aesthetic Log (AL5:18)

I wanted the figurative elements to be big in order to have more impact on the viewer. I cut out figurative shapes of the chattels, leaves and trees, prepared the glass and made a major amendment to the firing schedule (Appendix 29) to address the annealing issue (AL5:18). The removal of the core material was a lengthy and delicate process which took 16 days (AL5:19). The amended firing schedule had produced a stress-free piece of glass, confirmed by the stressometer (AL5:20). The inclusion colours were explained in Aesthetic Log entry AL5:21:

> *I am going to explore the use of scale and proportions in this piece. Inclusions – the brighter the better. I am going to vary the inclusion size from large to small in this piece and use hand dyed silk fibres, recycled plastic shopping carrier bags, papers, raffle ticket stubs, fruit netting, cotton, threads, yarns, synthetic fabrics. I will manipulate the inclusions layer upon layer as to represent the wooden slats of the chattel walls. For the trees and leaves I want a mottled effect to reflect their patches therefore the inclusion size needs to be*

larger. I want to try something different in this piece... Instead of creating separate voids to hold certain colours I am going to define the walls and roof of the chattels using colour within the void forms. I think I will add a found object like a Barbados stamp to give the artwork a sense of realism and to break up the large area of chattel void.

My observations of the finished artwork were captured in the Aesthetic Log (AL5:22):

There is something about this piece that distinctly reminds me of the St. Peter district. Maybe it is the bright glistening colours and the crispness of the white background... or the mixture of different inclusion sizes and colour that create a fragmented effect... or the flora contrasting with the more solid colour of the chattels... Maybe it is the figurative voids against the organic voids which seem to oppose one another... a kind of man-made verses nature. My eyes get drawn from the edges to the middle part then I begin to recognise two distinct layers... Overall a generally fun loving, bright crisp experiment jammed packed with the Caribbean spirit that makes me quite cheerful.

The fragmented effect of the flora and the more solid colour of the chattel are shown in Figure 5.7.

Figure 5.7 Topham, S., (2009) Experiment 14, Flora and Chattel *in* Aesthetic Log (AL5:22)

This artwork has several links back to the matrix and colour theory (AL5:23). The absorption of colour by the inclusion types create a significant contrast between the upper and lower void layers (saturation contrast). The summery yellows and pinks in the lower void layer (Figure 5.8) advance whilst the green and blue inclusion types recede creating depth which is enhanced by the addition of the upper layer (cold/warm contrast).

Figure 5.8 Topham, S., (2009) Experiment 14, Digital Separation Lower Layer *in* Aesthetic Log (AL5:23)

The glistening of the inclusion type colour within the voided forms is due to the thickness and transparency of the fused glass layer (transparency and colour). The crisp white void space is due to the fused layer of glass above the background void spacing inclusion type (transparency and colour). The variance of the inclusion size within the void forms enhances the colour contrast and separates the artwork into two planes (light/dark contrast). The diagonal void forms and the inclusion manipulation induce eye movement when viewing the artwork (colour direction).

I used several of the technical principles identified in previous experiments to develop the voided glass for this experiment (AL5:24). This experiment resulted in new principles associated with the success of large void areas in the first void layer and amendments to the firing schedule to improve the stress annealing, as well as a requirement for the use of a stressometer to check the safety of the glass (AL5:25).

Reflecting on my experience and notes in the Aesthetic Log, the problem which led to the cracking of the first piece of glass turned out to be helpful in that it spurred me to invest in a stressometer. Using this device gave me a tremendous boost in confidence knowing that the glass would be safe to use in public spaces. It felt like crossing a bridge from experimentation to professional production. However, the negative side to the experiment was the 16 days it took to carefully remove the core material.

Experiment 15: Aesthetic Log AL5:26 to AL5:30 – Firing Schedule Appendix 29

Figure 5.9 Topham, S., (2009) Experiment 15, Andromeda Gardens, 25 cm x 100 cm

My inspiration for this experiment (Figure 5.9) came from a visit to the Andromeda Gardens in Barbados, the many icons associated with the island and the need to produce a large-sized artwork measuring 1 metre in width (AL5:26). I translated my sketches into a composition (Figure 5.10).

Figure 5.10 Topham, S., (2009) Experiment 15, Initial Composition *in* Aesthetic Log (AL5:26)

This composition resulted in three layers of glass with the base layer being transparent dark green and two void layers, which was fired using the firing schedule in Appendix 29 without amendment (AL5:27). Once the fibre had been removed and the glass checked with a stressometer, the inclusions were added as noted in the Aesthetic Log (AL5:28):

> *If I am going to paint chickens, pineapples, bats, chattels, coconuts, leaves, lizards, bananas and hibiscus flowers onto scrap pieces of canvas I need to get their sizing right otherwise they will not fit within the void forms... I will first make paper cut outs and place them onto upper void layers to get the size and positioning correct... That worked quite well... I really enjoyed painting the icons on the scrap pieces of canvas... Oh no the canvas is buckling and creasing as I insert it... I have stuck a piece of foam board to the back of the canvas... This works really great the icons are pushed up to the inner surface of the glass. I am going to use fun Caribbean colours... In the bottom layer I will use dark blues, pinks and greens and in the top layer a different contrast of light pinks, oranges, yellows and greens... I want the dark green coloured glass to represent the dominant colour in the Andromeda Gardens with the brightly coloured flowers and creatures surrounded by a backdrop of lighter green leaves. I will use a medium inclusion size of curtain fabric, cotton,*

paper, wool, yarns, hand dyed silk fibres, foil and organza. I will also add a Barbados stamp to add a touch of realism.

My observations regarding the final artwork were recorded in the Aesthetic Log (AL5:29):

The bright colours and icons make this a very cheerful piece. The background green glass is much darker than I imagined giving the whole piece impact. The top coloured inclusions contrast so well with the dark green glass... they seem to be a lot brighter than when they were outside the glass. There's a distinct glossiness to the glass. The stamp blends nicely with the other inclusions. The shapes are simple which tend to make me look at the inclusions more. The wider void forms result in much more colour. The bottom layer inclusions are significantly darker in colour than the top, with a refined colour palette of blues, pinks and greens which result in an illusion of depth. The top layer consists of a more vibrant colour palette with the main colours being oranges, yellows and pinks capturing the spirit of fun and happiness of the Caribbean. The dark green coloured glass background seems to enhance the colour between the foreground and background. Overall another successful artwork that reminds me of the colours and fun of the Caribbean.

Figure 5.11 shows the detail of the inclusions and icons.

Figure 5.11 Topham, S., (2009) Experiment 15, Inclusion Detail *in* Aesthetic Log (AL5:29)

There are several links back to the matrix and colour theory (AL5:30). The first being contrast between the dark green transparent glass representing the void spacing in the base layer and the paler colours in the upper void layers. The effect of this contrast is to intensify the colours and inclusion manipulation in the upper layers as well as creating three distinct planes within the artwork (light/dark contrast). The intensity of the inclusion type colour is enhanced by the glass thickness and transparency of the void forms (transparency and colour). The distinct glossiness of the void spacing is enhanced by the green transparent glass inclusion type (reflection and colour). The vertical inclusion manipulation and wide void forms prevented the illusion of height but created a sense of rhythm (colour direction).

The firing schedule for the experiment resulted in no adverse effects on the glass. Several of the technical principles identified in my previous experiments were used to develop the voided glass for this experiment (AL5:31). This experiment resulted in one new principle associated with the firing of transparent coloured glass (AL5:32).

Reflecting on my experience and notes in the Aesthetic Log, this experiment was more to do with icons and their ability to bring back my memories of Barbados than colour theory itself. It did however represent a conclusion to the potential of the use of coloured glass within the artworks and therefore was significant in terms of my practice. Furthermore, the value of determining technical principles and their use in my practice was confirmed in this experiment, with 19 of the previous 33 being used to set up and fire the glass.

Experiment 16: Aesthetic Log AL5:33 to AL5:39 – Firing Schedule Appendix 29

Figure 5.12 Topham, S., (2009) Experiment 16, Caribbean Sea, 50 cm x 75 cm

The sea has always affected me on a deep personal level. The first thing I do when I visit a place is go to the beach and look across the endless body of water stretching out to the horizon. For me, this is a very personal moment and I feel that I am in a heightened state. The colours of the sea become so vivid and I feel a sense of harmony with the majestic movement of the ripples and waves. My inspiration for this experiment was captured by Aesthetic Log entry AL 5:33:

> *A bit overcast today but the colours of the Caribbean Sea are so intense this is going to be the defining piece in my research... I want this piece to flow freely across a big glass with a multitude of voids containing a whole host of blues. I want to capture the horizon as well to represent the awe that I feel at this particular moment. I will go landscape with the glass to show the expanse of water. The void shapes would be all wave like apart from the void placed at the top which will be straight to represent the horizon. I want the voids to twist so that the light bounces off the artwork adding to the movement.*

These elements of my inspiration were translated into an initial composition (Figure 5.13).

Figure 5.13 Topham, S., (2009) Experiment 16, Initial Composition *in* Aesthetic Log (AL5:33)

In total this piece took 111 days to complete. The task list and time sheet are shown in Appendix 30. It took approximately 2.5 days to create the initial composition, 45 days to carry out the core-forming processes and create the voided glass, 57 days to perform the trapunto operations, and 6 days to frame the artwork. I recorded the core-forming operations in the Aesthetic Log (AL5:34):

> *I cut smooth wavy strips of fibreboard today... I cannot keep exactly to my composition because once I start cutting it has to be done in one movement or else I will get rough internal edges on the voids similar to what happened in experiment 10... it's odd how things from previous experiments keep coming back. I like the variation in void widths that I have cut... some are too thick I need to cut them down... nice set of void strips I need to place them now... In the lower layer I have placed all void strips so that they run horizontally across the artwork. In the top layer I have done the same but made sure that I have created overlaps that are going to twist like in experiment 3. I have created a clear horizon line at the top of the artwork... Final checks complete... Firing schedule same as experiment 15 with no amendments... Set kiln programme... come back in two days... The lights are flashing in the house therefore the kiln must be working... Opened the kiln today looks like a satisfactory piece of glass... I will leave it for a few days just in case... No problems I will start removing the core material today... Wow this is difficult the small thin voids are difficult to access... It is difficult to get to the core material in the centre of the work because the bamboo stick keeps jamming... I'm glad that is over, it has taken me over a month to remove the core material... No problems with the stress check... The relationship between the being and non-being is clear to see at this stage.*

I also recorded the trapunto operations in the Aesthetic Log (AL5:35):

> *I am going to use medium chopped sized inclusions in the voids consisting of cotton wool, ribbon, angel hair, silk organza, lamé, silk, satin and lace... Today I have dyed lots of inclusions with different shades of blue... I like the way the silks have taken up the dye differently giving me a wide range of colour values... better place them in airtight jars... Well I have to start somewhere... I will put the very deep blue inclusions at the top of the voids where the horizon is and work my way down in graduations of colour until I get to the bottom voids where I want whites to depict the surf breaking on the beach.*

Figure 5.14 shows the upper layer void digital separation where the graduations of blue can be seen. I used a more intense blue mid-way down to add more impact to the artwork.

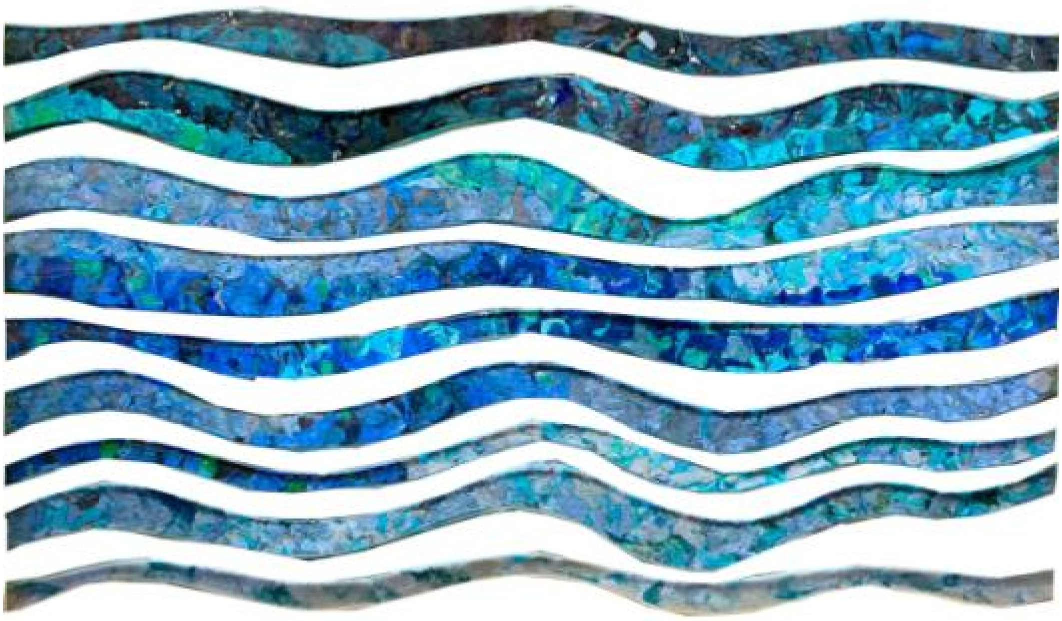

Figure 5.14 Topham, S., (2009) Experiment 16, Digital Separation Upper Layer *in* Aesthetic Log (AL5:35)

My observations about Experiment 16 were recorded in the Aesthetic Log (AL5:36):

> *This is staggering, I love this piece. The angles of the voids cause the light to sparkle across the piece, just like the actual sea. I feel like the sea is glistening as if water is flowing over the top of the inclusions... there is a surreal effect similar to that when looking out over a sunlit shimmering sea caused by the low voltage light emitting diodes... I see fluidity and rhythm not only in the organic void forms but also as the light moves along the top edges of the voids. I like all the different shades of blue... They are clearly much more vivid that when I put them in... This change is far more noticeable than in previous experiments. I like the way the colours blend with each other whilst in the voids and across the void layers... the voids and the colours seem to complement one another. I like the way the top layer void forms overlap the majority of the bottom shapes resulting in a feeling of intrigue of what's in the lower voids... I like the breadth of this piece as it gives the impression of the vastness of the sea... There is also very little exposure of the white background which I like because it emphasises the technique and inclusions more. I am so happy with the final result and so proud I have managed to produce it... Everything has come together at once... The best piece by far!*

A section of this artwork (Figure 5.15) shows the colour graduations and detail of the manipulated inclusions.

Figure 5.15 Topham, S., (2009) Experiment 16, Colour Graduations and Detail *in* Aesthetic Log (AL5:36)

The link back to the matrix and colour theory (AL5:37) was biased towards colour optics. The inclusion type colour was enhanced due to the transparency of glass of the void form, void spacing and layering (transparency and colour). The inclusion manipulation combined with the void forms, void spacing and void layering enhanced the vibrancy of some colours whilst dulling others (reflection and colour). The large inclusion size and colour patches in the void forms prevented the blending of boundaries even at significant distance from the artwork (optical colour mixing). The horizontal direction of the inclusion manipulation and the void form, spacing and layering created a sense of vastness and induced a horizontal rhythmic eye movement (colour direction). This eye movement was enhanced by the stream of light reflections from the edges of the void forms. The large inclusion size of some colour patches within the voided forms made the visualisation of patterns possible which also tended to be horizontal in nature (simultaneous pattern). The analogous and dyads formed by the blue inclusion types in the void forms, spacing and layering dominated the artwork (colour harmony). Some of the silk fibre inclusion types in the void forms had been dyed and steamed creating a contrast with the recycled inclusions (saturation contrast). The variance between light and dark inclusion types was significant but the distinction of separate planes was avoided due to the complexity of the void forms (light/dark contrast). I used the technical principles identified in the previous experiments to produce the voided glass (AL5:38), with the firing schedule in Appendix 29 proving satisfactory.

Reflecting on my experience and notes in the Aesthetic Log, there was no doubt that this was the deciding piece within my research that demonstrated that I could produce complex voided glass. A sense emerged that the technical challenge was over and that, provided I followed the technical principles, I could move my practice forward with great confidence. However, the experiment had surfaced an anomaly in that I did not understand why the increase in colour intensity between the inclusions inside the voids as opposed to outside the void was much greater in this experiment than in previous ones. The explanation in Aesthetic Log (AL3:39) should hold true for all experiments – so what had caused the difference? In an attempt to establish an answer, I contacted the Emerging Technologies Librarian, Rakow Research Library, at the Corning Museum of Glass (Brumagen, 2013 [Email]), who replied:

> There is an optical explanation for this increase in brilliance. Without the overlay, incident light can only reflect off the coloured glass based upon the law of reflection where the reflected angle is the same as the incident angle. When a transparent layer is placed on top, there are many more possible light paths depending on the distribution of light from the illumination source and the shape and roughness of the tesserae. This will enhance the amount of light reflected in a particular direction and change the appearance. If the sides of the tesserae are rough rather than smooth, a wider distribution of reflected angles will result. Any roughness at the interface between the transparent and coloured glass will also increase the distribution of angles. It is this distribution of angles that produces the brilliance when compared with the coloured glass alone. Regularly shaped pieces such as those made by machine will have a more limited number of possible light paths and therefore reduced brilliance.

Translating this reply in terms of my work, when the inclusions are outside of the glass the incident light can only reflect off the material type. When inside the glass the inclusion type, size and manipulation combine with the glass layer to afford many more reflection angles. Added to this the void edge above the inclusions also add to the number of reflections. In the case of Experiment 16, the extent and twisting of the voids was significantly greater than in previous experiments and increased the number of reflection angles, accounting for the enhanced colour. This finding defined a special moment in my practice, as not only did it lead to a new technical principle (AL5:39) but it also explained the uniqueness of the aesthetic qualities associated with this research and my artwork.

Experiment 17: Aesthetic Log AL5:40 to AL5:45 – Firing Schedule Appendix 29

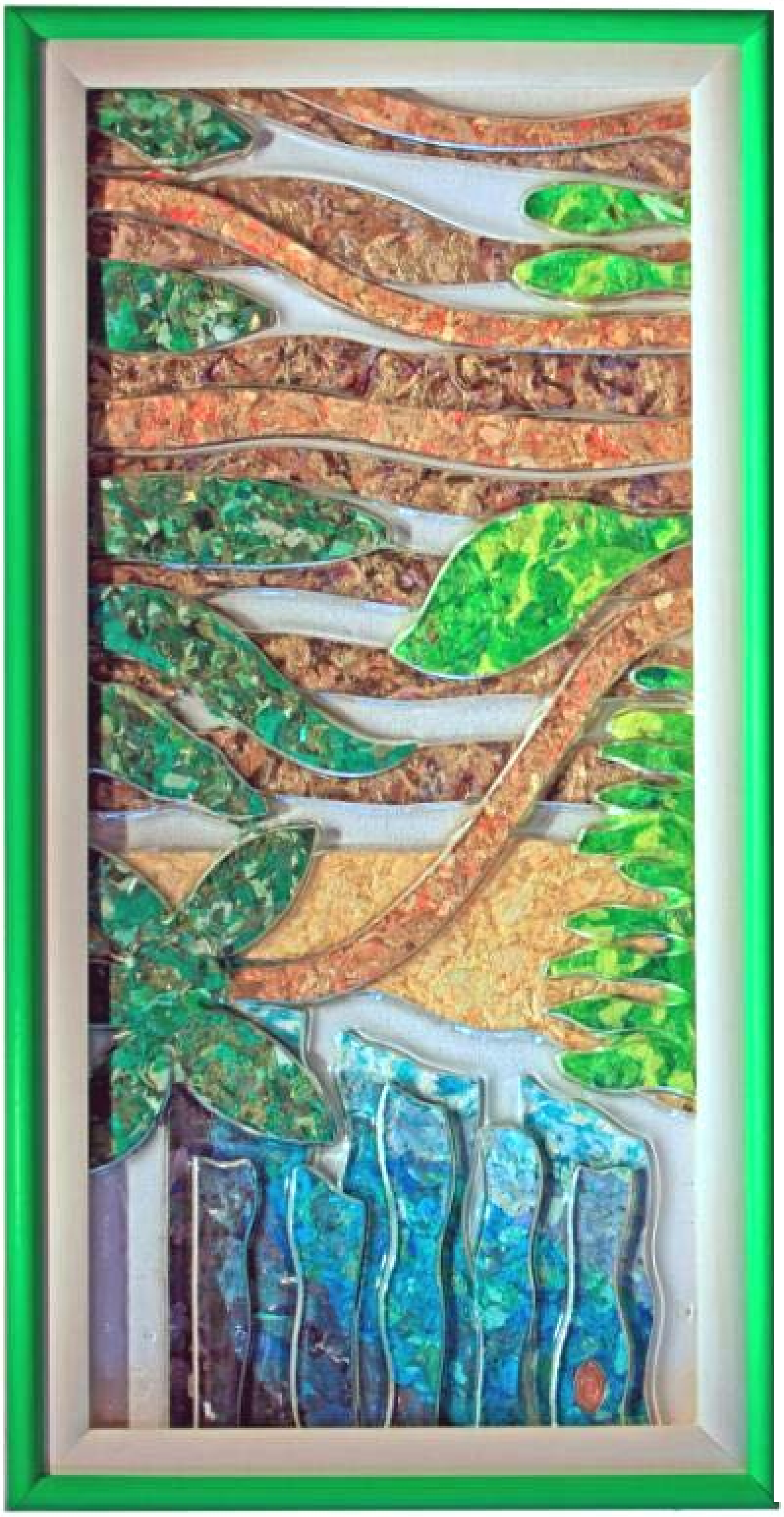

Figure 5.16 Topham, S., (2009) Experiment 17, Paynes Bay, 33 cm x 75 cm

My inspiration for this experiment (Figure 5.16) came from a visit to Payne's Bay in Barbados (AL5:40):

> *My last day on the island... Going for a walk along the beach... I open the door to my apartment and I feel the warmth of the early morning sun... Everywhere looks so bright and crisp... I walk along a footpath that leads to a barrier of palms trees which separates me from the beach and sea... I walk through this narrow band of trees and onto the beach... As I walk along the beach I notice how the sea ebbs and flows very gently onto the beach... I sat down on the warm sand and looked back from where I had walked and made a watercolour pencil sketch... My last walk...*

Figure 5.17 Topham, S., (2009) Experiment 17, Payne's Bay Watercolour Pencil Sketch *in* Aesthetic Log (AL5:40)

The watercolour pencil sketch I made on my last day in Barbados appears in Figure 5.17 and shows the barrier of trees, the narrow stretch of beach and the sea which I translated into an initial composition. The composition, preparation and inclusions were explained in the Aesthetic Log (AL5:41):

> *I want the voids to give the figuration rather than the inclusions... I will use three layers of glass and two void layers... I will place the upper layer voids over the bottom layer voids to create the narrative scene... Inclusions... Colours will be based around yellows, browns, blues and greens... I will use finely chopped silk, satin, cotton, lace, wool, threads, glitter, angel hair, silk organza, straw, sawdust, foil, hand dyed silk fibres, sawdust and some banana plant fibres I brought back from Barbados.*

My observations of the artwork were captured in the Aesthetic Log (AL5:42):

> *The first thing I notice is the palm tree moving towards the sea... I always remember being told palm trees will always sway towards the sea... I like the colours because they seem natural and give a sense of realism to the artwork... I like how the sea voids and horizontal colour graduations direct my eyes into the centre of the artwork. I like the contrast between the darker browns and lighter browns in the lower and upper tree voids... it is drawing me in, just like when I was walking towards them in Barbados... The palm trees glitter and sparkle as the light reflects off them... I really like the splashes of orange in the upper layers of the palm trees they seem to add a different dimension they stand out and catch my eye... It's surprising how the small flecks of red in the vivid green leaves keep grabbing my attention... I love the texture in the beach section caused by the banana fibres... it gives the artwork a real tropical feel... Really nice and tranquil.*

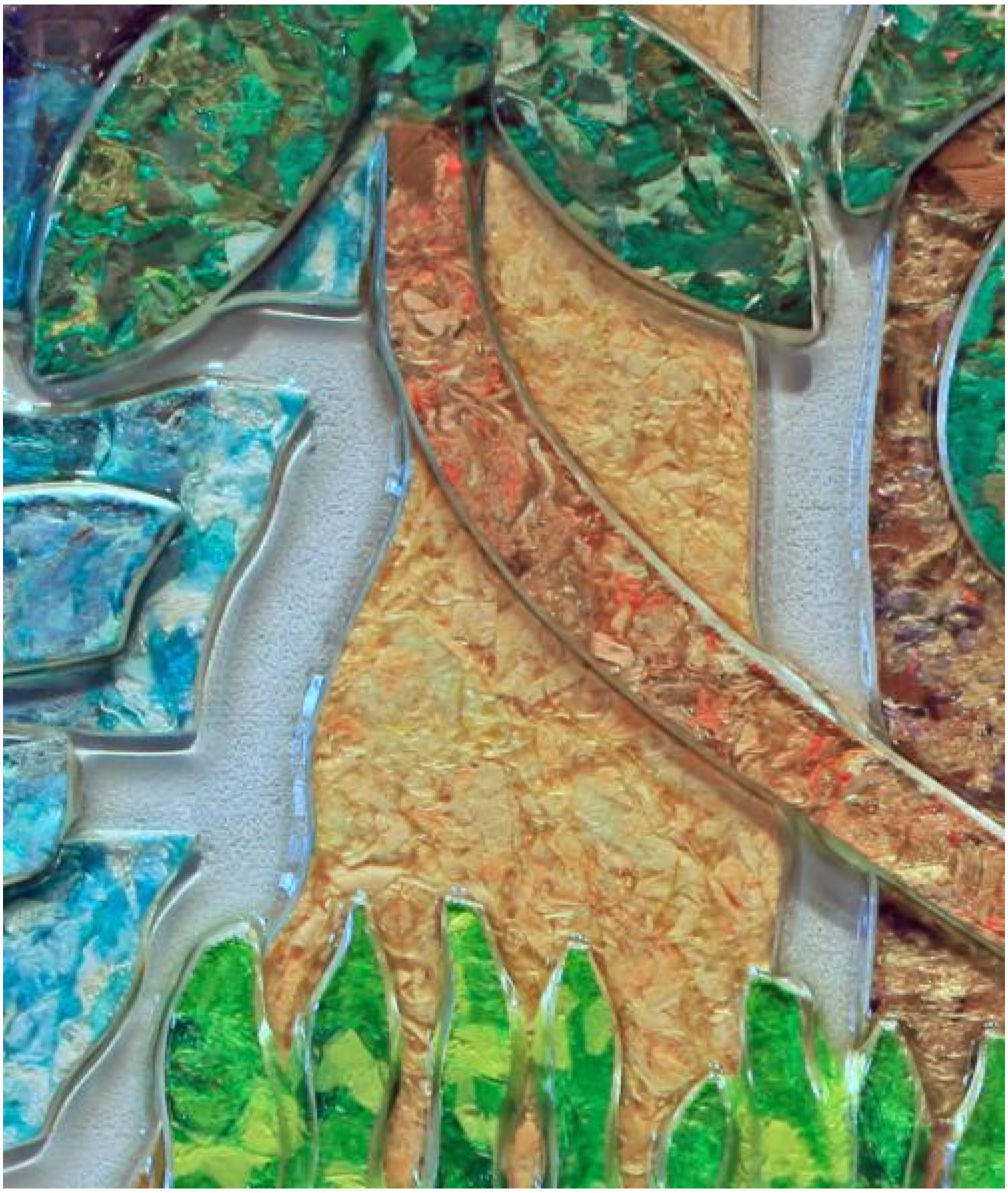

Figure 5.18 Topham, S., (2009) Experiment 17, Payne's Bay Detail *in* Aesthetic Log (AL5:42)

Figure 5.18 shows the fine detail of the inclusions and the naturalistic colour scheme of the artwork. Several aesthetic qualities in this artwork link back to the matrix and colour theory (AL5:43). The inclusion types of browns, yellows and greens and the yellows, greens and blues within the void forms create triadic colour schemes, which give the artwork a naturalistic appearance (colour harmony). The horizontal void forms and inclusion manipulations of the sea create a colour direction and induce the eyes towards the centre of the artwork (colour direction). There is contrast between the inclusion types of the upper and lower tree void layers creating two distinct planes within the artwork (light/dark contrast). The intermittent sparkling effect within the void form is enhanced by the golden metallic thread inclusion type (reflection and colour). The small inclusion sizes of orange fruit netting within the void forms concentrate the eye (contrast of extension).

Several of the technical principles identified in the previous experiments were used to produce the voided glass (AL5:44). A new technical principle was identified relating to figuration and void formation within the artwork (AL5:45). The glass was near perfect with only a slight grinding of the edges being required to enable a good frame fit, confirming once again the firing schedule in Appendix 29.

Reflecting on my experiment and entries into the Aesthetic Log, I felt confident that I could produce figuration by inclusions, void forms and a combination of both. However, I had a concern throughout the experiments that the three-dimensional edges of the glass would prevent these artworks being installed as panels on walls because they would protrude above the flat surface. I gave a great deal of thought to these issues before progressing onto the final experiment.

Experiment 18: Aesthetic Log AL5:46 to AL5:52 – Firing Schedule Appendix 31

Figure 5.19 Topham, S., (2010)
Experiment 18, Heliconia Plant,
48 cm x 21 cm

The three-dimensional form of the glass surface of previous experiments added to the aesthetic qualities of the artwork however, it left considerable gaps at the frame edge. Whilst this was not an issue provided that the artwork was contained within a frame, it would be problematic if two adjoining pieces of artwork needed to be **butt joined** together, for example in a multi-panelled design. Therefore the main aim of my final experiment (Figure 5.19) was to produce a figurative panel with the edges within a fine tolerance so that they could be butt joined to another piece. The inspiration for this experiment came from my sketches of a Heliconia plant and some vibrant flowers whilst on the island of Barbados (AL5:46), which I then translated into an initial composition (Figure 5.20).

Figure 5.20 Topham, S., (2010) Experiment 18, Initial Composition *in* Aesthetic Log (AL5:46)

The way I constructed this piece was a completely different approach to all my previous experiments (AL5:47).

> *I sketched out my composition onto the fibreboard so that both top layer voids and bottom layer voids were technically on one layer. I then cut this up and placed the background shapes (which were the bottom layer) onto the bottom layer glass and the flower image on the top layer glass. I then trimmed a quarter of an inch all around the background bottom layer shapes so that the glass had something to fuse to between the voids. Once fused, the background voids were extremely easy to remove as they were relatively large with the top voids proving more difficult.*

Figure 5.21 shows the placements of the upper and lower fibreboards prior to firing.

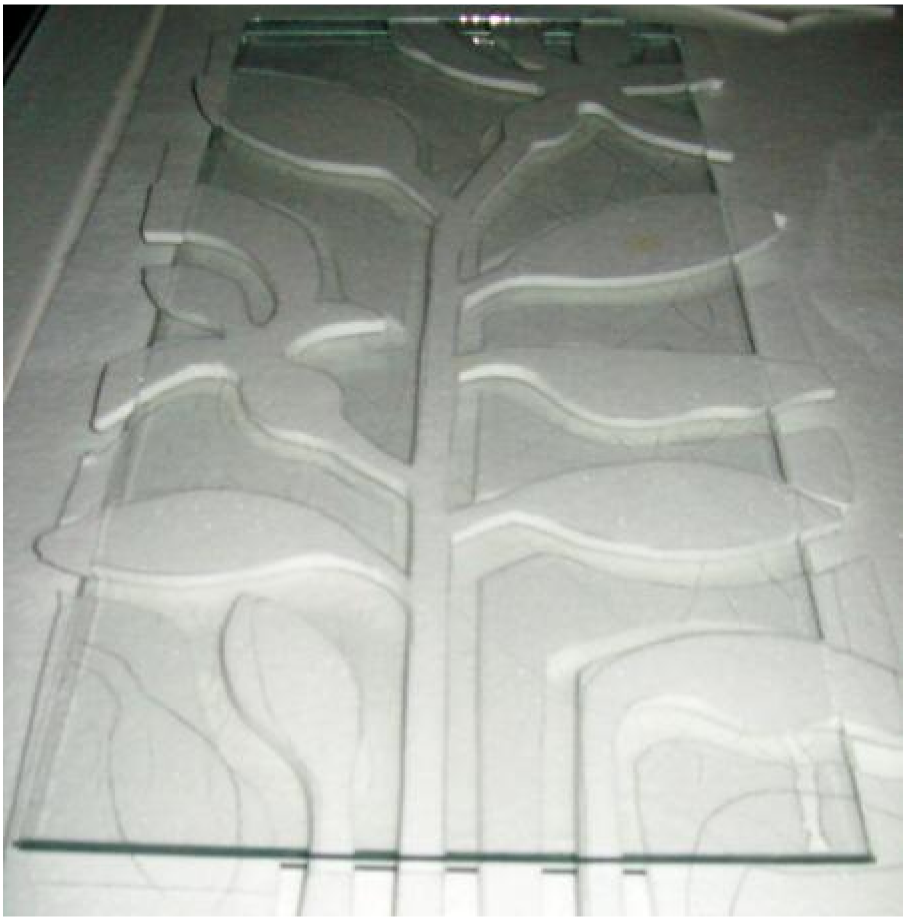

Figure 5.21 Topham, S., (2010) Experiment 18, Placement of Fibreboard *in* Aesthetic Log (AL5:47)

My observations of the experiment were recorded in the Aesthetic Log (AL5:48):

> *This is very different, the piece still looks three-dimensional despite having no overlapping of voids... It's like a flat piece of glass with ridges in it rather than the three-dimensional forms of the previous experiments... The edges are absolutely perfect they are so even... When looking at it from a distance I am not too keen on the space in the centre of the piece... I had no choice but to leave it out because I would not be able to reach it and remove the fibreboard... By inserting the same dark coloured inclusions in all background layers the bright flowers in the upper layers stand out more... I like the greens in the leaves really zingy to use Claire's expression... I like the mottled appearance with the lighter coloured and metallic threads and yarns entwined with darker fabrics on the bottom layer... The magenta of the flower contaminates the white background space... In all I think a very successful piece in terms of the structure of the void forms that would enable it to be butt jointed with a similar piece.*

Figure 5.22 Topham, S., (2010) Experiment 18, Contamination of Magenta *in* Aesthetic Log (AL5:48)

The most noticeable link back to the matrix and colour theory (AL5:49) is the contrast between the inclusion types of the lower and upper void layers which recede and advance respectively enhancing the three-dimensional effect of the work (cold/warm contrast). The inclusion size of the magenta creates colour spread on the white background void space as shown in Figure 5.22 (optical colour mixing). The metallic inclusion type within the lower void forms create a mottled reflection effect (reflection and colour). This effect is enhanced in the lower void layer by the double thickness of transparent glass above it (transparency and colour). However, as I prepared the digital separations of the artwork, the base layer reminded me of work carried out by Wassily Kandinsky and his students around 1930 concerning colour and line that I had seen vague references to during my literature search into colour theory. After exchanging emails with Dr Klaus Weber, Curator of the Bauhaus Museum (2013 [Email]), I received several documents relating to the students' work, and once they were translated[37] from German to English a complete picture began to emerge.

Kandinsky (1926/1979:69) postulated that an angular line has greater tension than a straight one and acute angles have greater tension than obtuse ones. Kandinsky next considered the different angles in relation to a colour scale based on a cold/warm relationship. These were portrayed by one of Kandinsky's students Kessinger-Petitpierre in 1929/1930 as shown in Figure 5.22 (middle). The acute angle of yellow is regarded as the tensest and warmest (30 degrees) and orange (60 degrees); the right angle is red (90 degrees); and the obtuse angles are violet (120 degrees) and blue, regarded as passive and cold (150 degrees).

[37] Translation from German to English text kindly provided by Josef Eckert, Konigswinter, Germany.

Figure 5.23 Left: Digital Separation Base Layer *in* Aesthetic Log (AL5:49) – middle: Kessinger-Petitpierre, F., (1929/30) *Angles in Relation to Colour*[38] – right: Digital Separation Upper Layer *in* Aesthetic Log (AL5:49)

The angles in the middle image of Figure 5.23 seem to match many of those in the digital separation of the base layer (left). The colours and angles in the middle image are similar to those in the digital separation of the upper layer, for example the acute angle of the yellow, the right angle of the red and the obtuse angle and horizontals of the green and blues. This creates a new aesthetic quality associated with void form and inclusion manipulation (colour and line).

I used several of the technical principles that I had learned through the previous experiments to produce this artwork (AL5:50). I also identified a new technical principle relating to the placement of the fibreboard forms (AL5:51). The glass was perfect and required no grinding of the edges, indicating that the firing schedule in Appendix 31 was satisfactory.

[38] Inventory Number 3576/6.

Reflecting on my experience of the final experiment and entries into the Aesthetic Log, the finding associated with colour and line felt like it added to my status of researcher/maker, maybe because of the awe of communicating with the Bauhaus. The colour spread identified in the artwork is interesting as it demonstrates another aesthetic quality which links back to early Christian Mosaics, although on this occasion it was not intentional. An entry into the Aesthetic Log records my feelings at the end of this experiment (AL5:52):

> *I feel like a fish being hooked and dragged to somewhere I don't want to go. The perfect edges lead me to think in terms of wall tiles, repetition, production and all those things I associate with non-art. I don't want to let go of them being just beautiful artworks.*

Summary: Chapter Five

My experience of the last six experiments was significant as it reconfirmed the way I like to work (AL5:53):

> *This trip has been good for me... I like going to a place that inspires me - just sitting there absorbing the atmosphere making sketches and paintings, their translation to initial compositions simply flowed... It's really difficult to explain. I get a vibe about a place that inspires me so deeply like St Ives and Seychelles and it brings out the best in me... I mean as opposed to being told that I have to make a composition from something like filigree... It felt different this time returning to the island. I was going to work not to play... I had a sense of pride, for the first time it felt like I was working as a professional artist... I very much enjoyed that.*

The steaming of the silk fibres and the transparency effect significantly enhanced the vibrancy of the saturated colours in Experiment 13. However, the most significant finding concerning experiment 13 was the figurative image formation created by the inclusions as opposed to the glass voids, emphasising the artistic rather than the technical.

The breakage in Experiment 14, whilst hugely disappointing, did not seem to place me under so much pressure as did the failings of Experiment 1. I just treated it as another problem to be solved. The failure led to a significant amendment to the firing schedule in terms of increased annealing time and the purchase of a stressometer, which made me feel more confident about the safety of displaying my work in public places. My second attempt at Experiment 14 combined figurative inclusion manipulation with figurative forms in two layers, each with its own colour scheme, which tended to divide the composition into two distinct planes. My amendment to the firing schedule resulted in a successful piece of glass measuring 50 cm x 75 cm. This represented the optimal size in terms of costing and the maximum weight that could be handled safely during the core removal and insertion processes.

Experiment 15 continued the theme of images within voids, resulting in painted icons being placed within the voids and combined with inclusions, which evolved into an artwork that seemed to capture the atmosphere and the colours of the Caribbean quite well. I discovered by using a dark green contrasting transparent glass that the lighter colour inclusions were more decided.

Experiment 16 proved that complex void structures could be applied to larger sizes of glass. I would argue that the finding in Experiment 16 relating to colour optics and early Christian mosaics was most significant because it explained the rationale for the uniqueness of the aesthetic qualities at the intersection of the three circles. The inclusion type, size and manipulation increased the number of reflected rays. The reflected rays were further increased by the glass above and to the side of the voided forms and the angles of the glass caused by the twisting of the voided strips.

Experiment 17 was concerned with tying up some loose ends in the research, which included using horizontal and vertical voids in separate areas of the composition, naturalistic colour schemes, and experimenting with inclusion types such as banana and triadic colour harmonies.

Experiment 18 was the final experiment which originally had intended to emphasise the technical by way of producing perfect edges that did not need grinding and would butt together to allow for various forms of panelling. Whilst I achieved this successfully, I discovered an unlikely relationship between the work of Kandinsky in terms of colour and line and this experiment, which produced an avenue for potential future research.

In terms of technical development, I identified a further 10 principles, as shown in Appendix 33. The last column of the Appendix shows how the principles of the earlier experiments were integrated into Experiments 13 to 18. In addition to the technical principles, Experiment 18 had created a potential pathway for entry into the wall tile/panel market, but this had created a tension within me of moving away from art to a more manufacturing basis.

In terms of the linking back to colour theory, the experiments confirmed 26 of the 42 anticipated unique aesthetic qualities identified in Appendix 12 of which 19 had been previously identified in experiments 1-12. In addition to confirming 7 further aesthetic qualities a new one was identified namely colour and line. Figure 5.24, shows the frequency of each aesthetic quality where it was considered to be significant to the artwork, the full account of which is included in Appendix 32. Compared to small glass experiments, light/dark remained the most dominant contrast, and colour direction the most noticeable colour compositional aesthetic quality. In terms of colour optics, there was a change from optical colour mixing in the first set of experiments to transparency and colour becoming the most noticeable aesthetic quality, which confirms my findings identified in Experiment 16 concerning the increased number of reflected rays.

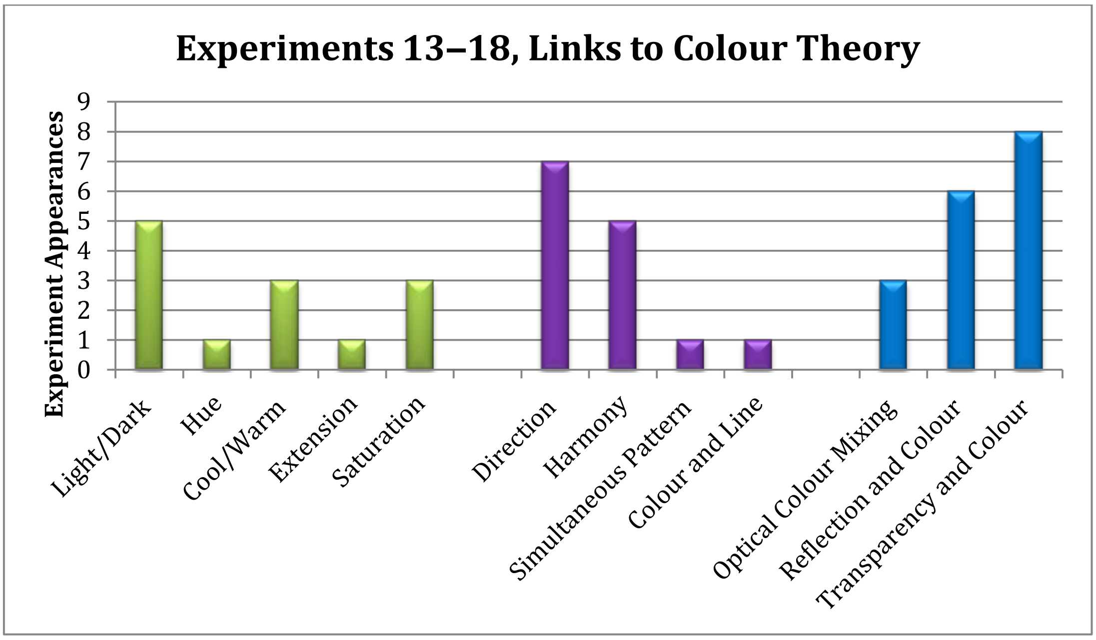

Figure 5.24 Topham, S., (2013) Experiments 13–18, Links to Colour Theory [Graph]

Throughout the experiments I became much more confident in using the new technical principles I had generated in earlier experiments and how colour theory could be used to explain the unique aesthetic properties of my work. In all, it was a significant movement forward for my practice.

Chapter Six

Turning Failure into Success

Softness as an Aesthetic Quality

This chapter explores the use of the glass left over from the failures of Experiment 9 and Experiment 14 to establish whether new directions for the artwork could be found. Figure 4.27 shows the left-over glass as a result of an unsatisfactory firing schedule resulting in a thin top layer of glass which would not withstand the pressure of insertion and would probably break. An entry into the Aesthetic Log records my further examination of this glass and my attempt to insert inclusions (AL6:1):

> *Well the voids on the top are very thin... the bottom layer looks like it has not fused at all... Good grief the stressometer shows multiple stress points... I am going to have a go at stuffing this piece and see what happens... I will have to do this blind because I need to place a tea towel over it to stop the glass from flying should it break... So far so good about half of the stuffing has gone in... I can hear little pings but I cannot see any cracks... I can feel the pressure now it's getting harder to insert... it's gone... all the insertions have sprung out... they are all fluffed up they look so soft... the glass is toast I will never be able to work with that... will cut my hands to ribbons.*

Figure 6.1 Topham, S., (2013) Experiment 19, Exposed Inclusions *in* Aesthetic Log (AL6:1)

Figure 6.1 shows the breakage of the glass with the broken pieces removed from the exposed inclusions. My reflections after breaking the glass were recorded in the Aesthetic Log (AL6:2):

> *I like the softness of the exposed fragments they bring another aesthetic quality to my work... That softness is inherent in a lot of the experiments but I don't see it as such because the fibres are compressed inside the void forms... If I want the inclusions to show through I will need to create stress free openings in the upper voids and find a way to stop the inclusions from falling out... Need to give this some thought.*

Eventually I decided that the best way to cut openings in the top voids was to purchase a Makita glass saw (AL6:3). The saw produced perfect cuts, allowing me to reclaim some of the glass from Experiment 14 and produce the open voids (Figure 6.2).

Figure 6.2 Topham, S., (2013) Experiment 19, Open Void *in* Aesthetic Log (AL6:3)

I inserted finely chopped yellow inclusions under the enclosed void sections by creating a bamboo dam (Figure 6.3), which allowed them to be tightly inserted into the closed sections of the void forms.

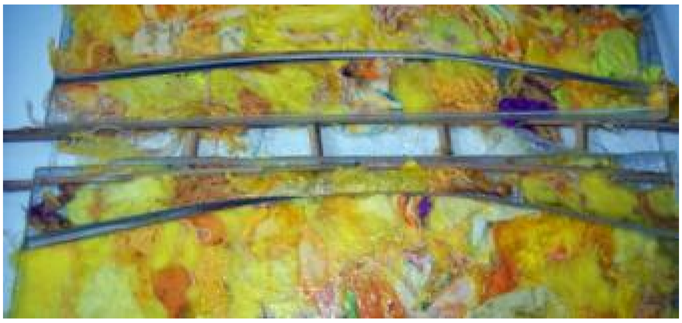

Figure 6.3 Topham, S., (2013) Experiment 19, Bamboo Dam *in* Aesthetic Log (AL6:4)

Blue silk fibres were then inserted into the open section of the void and tucked under the tightly inserted yellow inclusions as a means of restraint (Figure 6.4).

Figure 6.4 Topham, S., (2013) Experiment 19, Exposed Silk Fibres *in* Aesthetic Log (AL6:5)

My observations of the experiment were recorded in the Aesthetic Log (AL6:5):

> *The first thing I see is the softness of the exposed silk fibres... they appear softer than the ones inside the void forms... but they are not really... this aesthetic quality of softness requires more research... The technique is intriguing because it reminds me of the trapunto slitting process... instead of the slit being underneath it is on top and not closed off.*

In relationship to colour theory, I discovered a quotation that specifically mentions the hardness and softness of these two colours:

> But sight has been known to harmonize not only with the sense of taste but other senses. Many of the colours have been described as rough or prickly, others smooth or velvety... Some colours appear soft, others hard... the tactile feeling aroused by yellow is hard, sharp, and prickly, while blue is soft and velvety. (Kandinsky 1912/1947:45)

This quotation above is a reference to one of synaesthesia, which Kandinsky described as a crisscrossing of stimuli and sensations in the sense faculties. Fedderson (1993:4) uses an alternative psychological association as the basis for his theory of soft sculptures. Figure 6.5 shows a shoe placed on top of a pile of books. From a distance an association is made between the shoe and the normal soft material from which it is made. It is not until the viewer approaches the sculpture that they learn the shoe is made from acrylic material, which is hard.

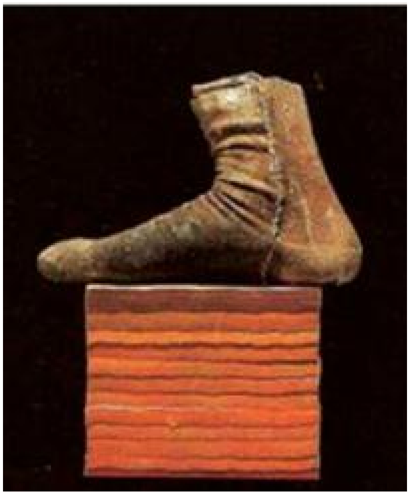

Figure 6.5 Young-Hoon, K., (1988) *Foot Book in* Feddersen, (1993:4)

Albers makes another distinction between hardness and softness when he writes:

> By exercising comparison and distinction of colour boundaries, a new and important measure is gained for the reading of the plastic action of colour, that is, for the spatial organisation of colour. Since softer boundaries disclose nearness implying connection, harder boundaries indicate distance and separation. (Albers, 1963:31)

This is a link here back to optical colour mixing referred to in Chapter Three and Aesthetic Log entry AL3:38: '*At a distance colours seem to merge, it is as though the edges of the coloured inclusions soften... The boundaries of the large inclusions do not disappear'*. Furthermore, the reference made to the tracing of the virgin's head in

Chapter Three (p80) also relates the size of tesserae to the quality of softness. Gibson and Dibble also makes reference to an edged or bounded surface and hardness when he writes:

> The word hardness is not an adequate term for the quality signified. It suggests tactual and kinaesthetic meanings which are not intended, such as the softness of fur and the hardness of marble. What is meant is only a kind of visual definiteness which probably goes with the capacity of the eye to accommodate for the surface in question. In this sense, fur and marble are equally hard. (Gibson and Dibble 1951:414)

A further connection can be made back to colour theory in terms of cold/warm contrast as Sullivan (1927:448) writes:

> Temperature was found to play an important part in perceptions of softness and hardness. Warmth itself has the pattern, texture, and lack of boundary which we find in all perceptions of softness; it is diffuse, filmy, and indefinite in boundary. Cold itself has the pattern, texture and boundary which we find in perceptions of hardness; it is compact, uniform, and definitely bounded.

These findings imply that softness and hardness are not just related to the sense of touch associated with the physical properties of the material but also the sense of vision and psychological association. These findings also support my view that the terms ‘hardness’ and ‘softness’, which are often categorised as opposites, are better understood in terms of a continuum.

Reflecting on my artworks, a continuum of hardness and softness can be established using senses other than touch, for example colour theory and psychological associations of inclusion type, size and manipulation. Figures 6.6 to 6.10 show the perceived qualities of hardness supported by Aesthetic Log entries AL6:6, AL6:7, AL6:8, AL6:9 and AL6:10. Figures 6.11 to 6.15 show the softer end of the continuum supported by Aesthetic Log entries AL6:11, AL6:12, AL6:13, AL6:14 and AL6:15.

Figure 6.6 Topham, S., (2008) Experiment 8: *The coral, sand and plastic netting are recognisable from quite a distance. The sand does not act as a blending agent, resulting in clear boundaries around the coral. The association of coral with hardness is greater than that of sand and softness.*

Figure 6.7 Topham, S., (2008) Experiment 2: *The metallic leaf used in the base layer void is recognisable and clearly defines the boundary of the void form, and fails to mix optically at a distance resulting in an association with hardness. The suggestion of leaf softness is also absent.*

Figure 6.8 Topham, S., (2008) Experiment 5: *The first, third and fifth void forms have relatively large-sized textile inclusions so that there is a natural association with softness. However, the colour and manipulation defines clear boundaries which create a sense of hardness.*

Figure 6.9 Topham, S., (2009) Experiment 14: *The inclusion size, contrasting green and orange colours, give a pattern and texture suggesting a dominant coldness and hardness despite the summery pinks in the lower void layer, which suggest warmth and softness.*

Figure 6.10 Topham, S., (2008) Experiment 10: *The inclusion manipulation in the upper layer results in an appearance which has less hardness. However, the variety of inclusion types and contrasting colours still present fairly well-defined boundaries. The figurative void forms enhance the appearance of hardness.*

Figure 6.11 Topham, S., (2009) Experiment 15: *Despite the variety of inclusion colours and the icons within the upper voids, there is a beginning of softness. The filmy appearance of the pastel colour harmonies manipulate into softer edges. The void width enhances this effect.*

Figure 6.12 Topham, S., (2009) Experiment 16: *The silk fibre inclusion type and the analogous colour scheme reduce the boundary definition giving a visual appearance of softness. The rhythmic flow of the void form edges and the reflection of the illumination reduce the appearance of softness.*

Figure 6.13 Topham, S., (2009) Experiment 13: *The silk fibre inclusion type and felting technique of manipulation result in optical mixing at a very close range causing a diffusion of boundaries. The appearance of softness is enhanced by the association with the material properties of softness.*

Figure 6.14 Topham, S., (2012) Boat Artwork: *Once again silk fibre is the main inclusion type. In this artwork the red void edge creates a well-defined boundary over the yellow. The blue and green void appears softer due to the matching of the manipulation forms with the void edge.*

Figure 6.15 Topham, S., (2012) Aloha Artwork: *The highest degree of softness attainable without exposing the silk fibre through an opening within the void. Analogous colour schemes of felted silk fibres contained within separate void forms which gently overlap each other.*

Summary: Chapter Six

The words ‘Soft Glass’ in the thesis title were originally a description of the temperature which represented the softening point of glass. This temperature placed my research in the context of kiln-formed fused and slumped glass rather than cast glass. Experiment 19 and my observations brought a new meaning to these words, with ‘soft’ being used to describe an aesthetic quality of my work even though the sense of touch was hardness due to the physical properties of glass (AL6:16):

> *Throughout this research I have struggled to firmly place my work in a specific context... I could argue fine art but I would fall right into the art and craft debate as both glass and textiles are regarded as craft... but the glass art work of Josef Albers was exhibited in the Tate Modern in 2006 and artist Patrick Heron created a glass window as a permanent feature at the Tate St. Ives gallery... There was also Marcel Duchamp in 1923 (The Bride Stripped Bare by Her Bachelors, Even) made from glass. Tracey Emin’s bed (My Bed) and tent (Everyone I Have Ever Slept With) are both made from textiles yet I feel uncomfortable about presenting my work as contemporary art... I don’t even like contemporary art I prefer paintings from the impressionists, all about catching the moment... that’s why I guess I like Michael Adam’s work. Clearly I have made technical advances in fusing and slumping but I feel there are too many textiles within the work to call it contemporary glass... This finding of softness takes me back to textiles softness as a textile property... Yes this has helped, I feel comfortable with textiles it is where I am from, textile art and textile sculptures... it feels right, it is where I started from with my textile degree... it fits the textile focus of where my practice is at this moment and gives me a definite direction, I can visualise my work in textile art exhibitions... Ideas are running through my head like crazy... I must concentrate and finish my thesis off... Amazing how this context has just made so much sense...true it has been there since the beginning but it did not feel real until now... just one word softness that’s all it took... and that came from a failure... I feel so happy... since last year things have been so good.*

Figures 6.6 to 6.16 show that softness and hardness are a significant addition to the aesthetic qualities identified in my research, and link well to the concepts of inclusion type, size and manipulation. However, in a wider context I will remember the significance of softness more for the impact it had on my practice and its future direction.

Chapter Seven

Conclusions

Research Aims Revisited

I begin my conclusions by discussing how the research satisfied the three aims of the thesis.

(1) Can I create a complex kiln-formed glass voided structure that supports itself?

The research shows that I was able to produce self-supporting void structures in small and large-sized glass. Experiment 10 (p131 to 134); showed that complex structures could include figurative forms that utilise the void spacing. Experiment 11 (p135 to 138) and Experiment 16 (p162 to 168); show very complex void structures resulting from void layering with only small amounts of exposure to the background void spacing.

(2) Can I trace and articulate the consequences of this technological development on my own artistic practice, and in particular assess the aesthetic qualities when combined with recycled inclusions and found objects?

In terms of technological development, I was able to trace and articulate 37 technical principles as shown in Appendix 33. I was also able to trace and articulate a new specification for firing schedules that included the use of inserted fibreboard. The state of knowledge in terms of the effects on the firing schedule that existed prior to this research, compared to that on completion of the research, is shown in Appendix 34.

In terms of assessing the aesthetic qualities, I discovered that the intersection point of the three circles comprising of glass, inclusions and colour, respectively, represented the uniqueness of my artworks. By matricising the intersection of the three circles, I identified 32 aesthetic qualities informed by colour theory that had the potential to affect my artworks (Figure 3.39). I discovered the main aesthetic qualities associated with my first set of experiments with the small-sized glass to be light/dark contrast, colour direction and optical colour mixing (Figure 4.36). In terms of the large-sized glass experiments, whilst light/dark remained the most dominant contrast and colour direction the most noticeable colour-compositional aesthetic quality, I discovered more emphasis on colour optics (Figure 5.3) compared to the small-sized glass.

(3) Can I draw insights into my relationship with the material processes as a way of further understanding my own artistic practice?

My first set of insights came from an examination of the historical contexts of core forming and trapunto, as they provided a means for working with the material processes. Thinking in terms of being and non-being changed my perspective from one of concentrating on the internal voids to seeing my work as a whole with inside and outside being of equal importance. I would argue that there are three specific insights which best describe the relationship of the material processes and further understanding of my practice. The first was my finding in Experiment 16 (p162 to 168); that gave an explanation for the uniqueness of the aesthetic qualities within my artworks in terms of colour optics of the early Christian mosaic period. Whilst matricising the intersection of the three circles identified the aesthetic qualities informed by colour theory, the finding in Experiment 16 (p162 to 168); combined them into one overriding rationale that defined the work within my practice – namely being that the material processes of combining the inclusions with a glass voided structure increased the number of reflected rays, which in turn enhanced the vibrancy and aesthetic appeal of the artwork.

My second insight was that of softness, identified as a result of a failure in Experiment 9 (p128 to 130). At the start of this research there was a natural drift towards the importance of glass, a situation compounded by the necessity to continually solve problems associated with the medium. The discovery that softness could be associated with a visual perception rather than a tactile experience had considerable impact in returning my practice to one focused in textiles. This insight also confirmed the contextualisation of my artworks as being that of textile sculptures within the general field of textile art, which also suggested a direction for future exhibitions of my work.

The third insight was that of recycling, in that my motivations towards this subject had been one of utilising local existing materials to produce artworks. The original intention had been to use recycled inclusions and found objects within the void forms, however I discovered that once complete the inclusions could be totally removed and replaced with different inclusion types and colour schemes, making the artwork itself recyclable – a concept that helped me to identify a future dimension for my practice, that of making artwork which is in itself recyclable.

Insights into Colour and Theory

My insights into colour and how they are likely to impact on my future practice are considerable. The differentiation of light based on location was very much apparent in the Seychelles with its overcast green canopy and Barbados in terms of the bright crisp light, both of which led to distinctive colour palettes. My palette from the Seychelles mainly consisted of colours from nature which were dominated by harmonies and which included greens and browns, as exemplified by Experiment 5 (p111 to 115); Experiment 10 (p131 to 134) and Experiment 12 (p139 to 141). My palette from Barbados was dominated by bright artificial colouring of the painted chattels and the contrasts of the fauna exemplified by Experiment 14 (p152 to 157). In addition, naturalistic reds and blues were added to the palette from specific studies of the sunset and the Caribbean Sea, as represented in Experiment 13 (p147 to 151) and Experiment 16 (p162 to 168).

I feel that I have matured as a colour practitioner through these insights into colour theory. I now see colour differently, actively looking for colour in terms of contrast, composition and optics when viewing a painting, landscape or seascape. I realise that colour can form the study of a lifetime, and therefore it will become a continual feature of my future practice.

I also see my work as quite different from that of glass artists in terms of how they use colour. Experiment 5 (p111 to 115); Experiment 6 (p116 to 120); Experiment 7 (p121 to 124) and Experiment 8 (p125 to 127) showed that coloured glass had limited use only as a background colour. The elements of refraction and transmittance of colour often present in the work of glass artists and stained glass practitioners were limited in my artworks due to frontal illumination. Furthermore, where straight-edged coloured glass pieces were used as in Experiment 7 (p121 to 124); they promoted discord with the organic shapes of the void form. However, I have made a significant contribution to the use of colour and glass, albeit one created by recycled inclusions rather than glass. Gray and Malins (2004: 105) define the practice of research in higher degrees as one of being to re-discover traditional practices and place them in new or contemporary contexts through the process of experimentation. In terms of colour and early Christian glass mosaics, and as a colour practitioner, I have made a contribution by re-discovering a part of early colour theory and applying it to present-day art. The insights associated with imagery and different forms of inclusion manipulation within void forms, across void forms and between layers created a different use and sense of colour complexity, which has now become a fundamental element of my practice.

Generalisation and Wider Perspective

My contribution to knowledge of 37 technical principles (and associated firing schedule documentation) can be generalised to the practice of fusing and slumping of kiln-formed glass. My methodology for deriving aesthetic qualities developed during this research can also be generalised to practice-led art and design research where three types of media need to be integrated. My insights gained from the examination of colour theories can be generalised to artworks of living artists, as demonstrated by the examples given in Chapter Three. In terms of the 32 aesthetic qualities related to colour theory and the concept of softness generalisations can be made to all future artworks that utilize the combination of glass voided structures and recycled inclusions.

In addition to textile sculptures, the technique of combining glass voided structures with recycled inclusions could be used to develop corporate artworks with marketing messages, as in the case of the unwanted effects of plastic bag disposal demonstrated in Experiment 6 (p116 to 120). Artworks could be developed for hotel and domestic interior decoration and set into walls without frames representing bas-reliefs such as those used in earlier times. The accurate edges of Experiment 18 (p173 to 179); created the potential for smaller artworks to be used as wall tiles, adding the aesthetic quality of softness to what are normally considered an interior decoration feature representing hardness. Art and craft kits could be developed which include empty pieces of voided glass to which customers add their own inclusions.

Future Research

I have already begun initial research in prototyping for the wider context. In terms of softness, I have conducted a further 16 experiments into inclusion softness and void forms. Figure 7.1 shows my attempts to combine softness with a tile form capable of being butt jointed for the purposes of interior decoration.

Figure 7.1 Topham, S., (2012) Initial Tile Prototype
15.5 cm x 15.5 cm [Silk Fibres and Glass]

The integration of the concept of being and non-being into my practice has expanded my thinking in terms of the non-being of void space, resulting in a direction which has significant potential for my work in terms of textile sculptures, as shown in Figure 7.2. The gaps left by the separation between the pieces are considered to be the non-being of void space. The inclusions in this piece also explore the use of flotsam and found objects from a beach around Carbis Bay in St Ives. The flotsam consists of different ropes which I untwisted and chopped to provide a random manipulation. In addition, this piece further investigates the theory of colour direction in terms of the curvature of the voided form.

Figure 7.2 Topham, S., (2013) *Flotsam and Found Objects* 38 cm x 110 cm x 5 cm [Recycled Found Objects and Glass]

Large-scale **architectural glass** is another avenue of future research but would require the solving of some significant problems. The main limitation of this research was scalability: the larger the size, the more difficult it was to remove the core material. Therefore research would need to be conducted in terms of core material and its removal. This could possibly take the form of finding a new type of core material or dissolving the existing one with chemicals. Further research would also be required to investigate alternative methods of inserting inclusions into large-sized glass in terms of access and placement. Research would also be needed to find ways of bringing the artworks to architectural standards both in terms of glass thickness or toughening and methods of fixing.

Concluding Reflective Statement

For me, the PhD journey started as an exercise in research to discover whether I could make complex voided structures into which I could insert recycled inclusions. The journey took me back into ancient, medieval and early Christian times as well as holding discussions with practising artists. It also started with a focus on the technical, changing gradually as time passed to the artistic, resulting in the glass canvas being considered as something to work on just like an oil painter. I discovered elements of core forming, trapunto, mosaics and aspects of textile art that all related to my artworks. I travelled to beautiful tropical islands where a change took place from being a student to becoming a professional practitioner. The last year of my studies was like no other as I embarked on writing the thesis and gradually got taken in by colour theory, finding links between the great teachers of the Bauhaus and past theories and how it affected my practice. Valuable insights and new knowledge in terms of the technical and artistic seemed to be self-generating whereas on previous occasions I had struggled to make sense of things. So for me the PhD process was not just an exercise in academic study, it was much more than that, giving me the confidence to begin my own business and continue as a professional visual artist. To this end I should like to thank everyone involved who have made this journey possible.

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Glossary

Absorption – The absorption of electromagnetic radiation waves by a material
Access Points – Openings at the material edges to gain access
Aesthetic Log – An assortment of data stored in digital and hard media which includes diaries, sketches, paintings, photographs, technical information and firing schedules relating to the research study
Aesthetic Qualities – Qualities associated with the aesthetic appearance of an artwork
Analogous – Three colours next to each other on a colour circle
Annealed – Glass that has undergone a process to remove most of the stress within it
Annealing Phase – A specific stage of the firing schedule
Architectural Glass – Large scale sheets of glass used as a decorative feature or as a structural piece within a building
Architectural Specifications – Requirements needed to fulfil planning and building regulations
Artificial Lighting – Any illumination that does not come direct from sunlight
Artist Maker – An artist that makes their own work
Artista – Is a trade name for a drawn glass, transparent with a slight surface texture, especially for fusing made by Uroboros for Schott AG in Germany
Artistic Practice – The process of producing artworks including the creative thinking processes
Bauhaus – Full name Staatliches Bauhaus (1919 to 1933) an art school in Germany that combined architecture and industrial crafts with the fine arts
Binder – The substance holding the core material together
Boundary Line – The edge of a recognisable colour, pattern or form
Brightness – Perceive intensity of reflected rays from an illuminated surface
Brilliance – The combined effect of brightness and colour saturation
Burnishing – The rubbing of a surface with a tool to make smooth or to polish
Butt Joined – Edges placed next to each other to form a matching joint
Ceramic Fibre Paper – A refractory fibre paper that can withstand high temperatures
Chemical Properties – The elements and bonds present within the glass structure
Christian Iconography – Art which includes portraits of Christ and biblical episodes
Chroma – A term used by Munsell to refer to aspects of saturation
Chromatic Interactions – The way adjacent colours appear to change one another
Coefficient of Expansion – A numerical expression of the increase in size of glass in relation to temperature change
Cold State – Glass as a solid form
Cold/Warm – Relates to hue sides on a colour circle with the side that includes blue relating to cold and the side that includes red warmth
Colour Analysis Software – Software that performs colour analysis on digital images
Colour Composition – Aesthetic qualities that relate to colour harmony, colour direction and simultaneous pattern
Colour Contrast – The differentiation of colours by measurements which include hue, light/dark, cool/warm, extension, complementary and saturation
Colour Direction – The application of colour in a composition to direct eye movement
Colour Harmony – Relationships between hue positions around a colour circle or sphere
Colour Optics – The branch of optical physics that relates to colour which includes refraction, reflection, dispersion and transmittance

Colour Purity – Colour without the addition of white, black or grey
Colour Relationships – Any relationship between colours and includes colour contrast, colour composition and colour optics
Colour Space – A colour space is a conceptual tool for understanding the colour relationships within particular colour theory
Colour Sphere – A colour sphere is a three dimensional colour space with its chroma graduations restricted to five modulations
Colour Spread – The colour cast of a hue that affects neighbouring colours
Colour Theory – Writings on colour that explain practice and meaning from antiquity including its culture, symbolism, art, science and order
Colour Tree – A term used by Munsell to describe variations in modulations of chroma scales within his colour space
Coloured Frit – Fine, Medium or Coarse crushed compatible glass
Combed – Trails of coloured glass dragged while still molten forming a zigzag pattern
Complementary – Two colours diametrically opposed to each other on a colour circle
Concentric Movement – A term used by Kandinsky to describe the inward circular movement of yellow
Conceptual Map – Diagram showing links between concepts
Conclusive Experience – A term used by Dewey to describe an experience which has a definable conclusion
Cone Photoreceptors – Cells in the retina of the eye responsible for colour vision in relatively bright light
Constraint – Method of holding inclusions in place
Contiguous – Colours next to or near to one another
Controlled Illumination – Illumination positioned in relationship to the artwork with a controlled intensity
Core Forming – The use of a temporary core material in glass making to create a voided space
Core Material – The temporary material used during the glass making process which is later removed
Cuneiform Tablets – A system of writing based on pictographs made on clay tablets which emerged in Sumer in the late 4th millennium BC
Deconstructed – Textiles unpicked or cut for the purpose of inclusions
Depth – The illusion caused by colour contrasts and physical depth of voided forms and layers
Designer Maker – A role that emphasises the technical during the making process
Devitrification – Cloudiness or a rippled effect on the surface of the glass due to an incorrect firing curve
Dialectic – Systematic reasoning, exposition, or argument that juxtaposes opposed or contradictory ideas and usually seeks to resolve their conflict
Diametrically Opposed Hue – Direct opposites on a colour circle
Digital Imagery – Images stored and viewed on a digital device
Digital Separation – The separation of an image into colours or layers using a computer
Discarded Textiles – Used textiles whose original function has expired
Discovery – The act of unexpectedly finding something out through experimentation or examination of critical knowledge

Duraboard – A high density insulation refractory board that can withstand high temperatures
Dyads – Two adjacent colours on a colour circle
Early Christian Mosaics – Mosaics from first century AD
Eccentric Movement – A term used by Kandinsky to describe the outward circular movement of yellow
Electronic Gallery Retrieval Systems – Electronic systems that store images of artworks and can be retrieved by defining certain aesthetic qualities based on colour
Embellishment – Objects or stitching to enhance the surface of textiles
Equilateral Triangle – A triangle whose three sides and angles are the same
Experiential Learning – Learning that is driven by reflection upon experience
Extension – Small quantities of colour which have a significant impact on the viewer
Fabric Manipulation – A process used to alter the form of a fabric which includes creasing, layering, pleating, folding and stuffing
Fine Refractory Material – Finely ground refractory materials that can withstand high temperatures
Firing Process – The process of applying heat to glass when in a kiln
Firing Schedules – A schedule that controls the temperature of the kiln during the firing process
Found Objects – Any discarded object with a nostalgic value
Frequency – Frequency is the number of occurrences of a repeating shape of an electromagnetic wave form over a period of time
Function – Relating to objects of domestic or industrial utility
Fused – The point at which glass fuses under the application of heat
Fusible Glass – Glass manufactured to a specification with a defined coefficient of expansion
Geometrical Relationships – Colour spaces derived from geometrical principles
Glass Blowing – The adding of air to molten glass to form a hollow area
Glass Decoration – Methods of decorating glass using colour, texture or other glass types
Glass Forming – Techniques that give glass shape including fusing, slumping, casting, blowing and cold working
Glass Parameters – Specific terms used in thesis to refer to glass void forms, spacing and layering
Glass Recipes – Chemical elements used in glass making with the earliest being discovered in cuneiform tablets found in Mesopotamia
Glass Tesserae – A small tile made from glass used in mosaic work
Glass Type – A glass made to a certain specification
Gold Leaf – Very thin sheets of gold
Grinding Smooth – Machine grinding the rough edges of glass
Heat Distribution – The even distribution of heat throughout the glass
Hexads – Six colours spread evenly around a colour circle
Hue – The name of a colour
Hue Circle – A circle comprising of primary, secondary and tertiary hues
Inclination Angle – The angle of the glass tesserae relative to the wall surface
Inclusion Manipulation – The creasing and folding of the inclusions within the glass voids
Inclusion Parameters – Specific terms used in thesis to refer to inclusion types, sizes and methods of manipulation

Inclusion Size – Chopped size of the inclusions within the glass voids classified as small, medium or large
Inclusion Type – The type of inclusions used within the voids and background of the glass artwork including textiles, silk fibres, paper, plastics, metals and mountboard
Inner Staining – Residue left on the inside of the glass after the core material has been removed caused by the binder
Intensity – An alternative name for saturation
Isosceles Triangles – Triangles that have two sides of equal length and two equal base angles
Kiln Controller – A microprocessor based programmer that controls the firing schedule of the kiln
Kiln Formed Glass – Glass formed with heat within a kiln
Layering – The placing of one material upon another
Light/Dark – The scale which refers to lightness and darkness within a colour
Lower Annealing Point – The point on the firing curve which determines the end of the stress annealing phase
Luminosity – The amount of energy reflecting off the surface of an object
Material Processes – Processes that can be applied to a specific material
Maximum Process Temperature – The highest temperature point on the firing curve
Molecular Constitution – The structure, composition, physical makeup, or nature of a fabric
Monochromatic – One colour including tints, shade and tone
Movement and Countermovement – Used by Klee to describe the movement of a pendulum
Movement – The movement by the eyes induced by the composition of an artwork
Nested Squares – Squares inside one another
Numerical Light Values – Used by Goethe to describe colours with maximum saturation and brightness
Opacity – Specifies the degree to which the background behind a colour can be seen or not seen
Optical Mixture – The distance at which the viewer is unable to recognise boundaries of colour or form
Partial Triad – The use of two colours from a triad based on a colour circle
Physical Optics – The branch of optics that deals with the description and explanation of all optical phenomena in terms of physical theories including reflection, refraction, diffraction and dispersion of light waves
Physical Properties – The physical properties of a material including hardness, softness and strength
Planes – The separation of a composition into distinct layers
Plastic Effects – A term used by artists to describe the three dimensional appearance of artworks
Pointillism – A painting technique in which small, distinct dots or strokes of pure colour are applied next to each other or in patterns to form an image
Primary Hues – Sets of hues used as the basis for creating a colour space
Purkyně Effect – The switching from cone (day) to rod (night) vision where shorter wavelengths such as greens appear brighter and red objects appear darker
Ramp Rate – The time it takes to get from one temperature to another
Real Time – The recording of events whilst actually performing them
Recycled Inclusions – Items whose original function has been exhausted and given a second purpose as inclusions within the glass

Recycled Textiles – Textiles that have been used before and are now being used again but in a different manner
Reflection – The return of a light wave from an object
Refraction – The bending of the light wave due to entering a medium with a different refractive index
Researcher Maker – Investigating the theoretical elements and insights whilst making artworks
Retina – A membrane lining at the back of the eye that is light sensitive
Rhythm – Movement caused by repetitive colour or lines
Rod Photoreceptors – Cells in the retina of the eye responsible for colour vision in relatively dull light
Sand Core Technique – Alternative name for core forming until it was discovered that the core material was not sand
Sandwich Glass – Gold foil fused between two layers of glass
Saturation – The dimensional scale of the perceived purity of colour
Secondary Hues – Hues that are created by mixing two primary hues together
Shade – The addition of black to a colour
Silk Fibres – Various silk fibres formed mainly from the larvae of mulberry silkworm (Bombyx mori) reared in captivity
Silk Screens – An open mesh sheet traditionally made from silk that is tightly constrained by a frame which allows textile colour paste to pass to form an image on the textile
Simultaneous Contrast – The ability of adjacent colours to create a visual illusion of colour difference
Simultaneous Pattern – A term used by Itten to describe the combination of similar colours and forms to create an illusion of pattern
Slashing – A fabric manipulation technique which allows the undergarment to be pulled through slashes in the top layer material
Slitting – To form an opening whereby stuffing can be inserted
Slumped – The heating of glass within a kiln until it bends and conforms to a moulded shape
Softness – A material property discovered by touch or perceived as an illusion
Split-Complementary – A colour harmony that chooses one colour and the colours on each side of the complementary to that colour
Stained – Fusing oxides onto glass to create a colour
Steel pans – Percussion musical instruments made from recycled oil drums
Strength – A term used by Chevreul to describe the saturation and intensity of colour
Stress – Forces within glass which may later cause breakage
Stuffing – Adding material by pushing inclusions through an access point
Surface Reflectance - The return of a light wave after striking a surface of an object
Temperature Curve – A graph of temperature related to time
Tertiary Hues – Hues achieved when a primary and secondary hue are mixed together
Tetrads – Four colours derived from forming a square or rectangle within the colour circle
Textural Structures – The formation of surface texture related to material type
Texture – The three dimensional appearance on the surface related to material type
Thermal Properties – In terms of glass it refers to thermal expansion, thermal resistance and annealing temperatures

Thermal Shock – The build up of stresses within the glass caused by incorrect firing schedules
Tint – The addition of white to a colour
Tone – The addition of grey to a colour
Transmittance – The amount of light that passes through glass
Transparency – Specifies the degree to which the background behind a colour can be seen
Trapunto – A fabric manipulation technique based on two layers of stitched fabric with stuffing in between
Triad – Three colours derived from forming a triangle within the colour circle
Unregulated Annealing – The lowering of the glass temperature due to the natural heat loss of the kiln
Value – The scale of lightness and darkness of a colour
Vibrant – The saturation and brightness of the colour
Vibration of Colours – A term used by Albers to describe the flashing of two adjacent colours along their boundaries
Viscosity – The speed at which glass flows
Visible Spectrum – The portion of the electromagnetic spectrum that represents colour and is visible to the human eye
Vivid – An alternative term for vibrant
Void Forms – The outer surface shape and interior space created by core forming
Void Layering – Layers of void forms
Void Spacing – Spacing between void forms
Voided Structure – Specific term relating to the completed glass and void forms after fusing and slumping
Wavelength – Wavelength is the distance between occurrences of repeating shapes of an electromagnetic wave form over a period of time and is used to define a particular colour within the electromagnetic spectrum
Waxing and Polishing – Technique of applying wax to give a polished surface
Weak Web Sections – Glass sections between void forms that create stress points within the structure

Extracts from Aesthetic Log

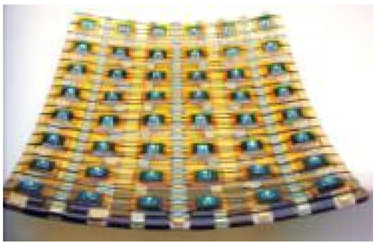
1:1 20:09:2007 *I am so excited I have found Trapunto a process that uses stuffing into voids. All I need to do in theory is to replace the two layers of fabric with glass and stuff the voids. If I used more than 2 layers then I could make the work more three-dimensional similar to a bas-relief sculpture. I could also use found objects for nostalgia, recycled textiles as well. I like the found object and recycled textiles idea. It fits with who I am, what I like and my practice.*

1:2 28:09:2007 *The research will be in two parts: the technical and the aesthetic. I am anxious about creating the glass with voids in it. I have absolutely no guidelines - where do I start. Sue or Prof Pete at Sunderland will know. Colin wants my second supervisor to be an Aesthetics expert so I guess that will take care of that.*

1:3 05:09:2007 *Scot's definition of textile sculpture - so a textile sculpture does not have to contain textiles providing that it relates to a textile process or textiles combined with non-textiles... Fabric manipulation processes... It would be good to combine these processes with my knowledge of glass. The glass could protect the textile.*

1:4 13:09:2007 *What exists in the field of textiles and fused glass?*

Weaving - Sally Dunnett describes work as, "Illusions of weaving are created by using the weights of stacks and strips of glass pushed and manipulated into place by the action of heat." (Dunnett, S., 2006, "OP4" in Christley and Evans, 2006: 41).



Printed Image - Kathryn Wightman screen printed images of textiles on glass (fused and rolled). (Wightman, K., (2006) "Colour me a Rainbow" in Christley and Evans, 2006: 110).

Quilting Image - Richard Marquis murrine fused to make quilt pattern then blown (Marquis, R., (1988-1990) "Crazy Quilt Teapot" in Klein, 2001: 139).

Embroidery - Sarah Ruthven similar process to Akester but slumps from back and describes her work as, "Glass has unique qualities, contemporary yet traditional, fluid yet solid, concealing yet revealing. These qualities allow me to represent items of clothing, soft yet hard, as fossils, as human and cultural fragments frozen in time." (Ruthven, S., (2005) "Fragment III" in Christley and Evans, 2006: 88).

Embroidery - Mary Ann Toots Zynsky fuses coloured threads of glass into slumped forms. (Zynsky, M., (2001) "Blue Moon Total Eclipse Isla Bella" in Klein, 2001: 228).

Kéké Cribbs combines actual textiles with glass but they are external. (Cribbs, K., (1992) "Baudino" in Klein, 2001: 50)

1:5 14:09:2007 *The research should be based around textiles that are included within the glass - no one has done that yet with fused glass. I could make panels that have a three dimensional surface that could be hung on the wall or fixed in some way as interior decoration. This is beginning to make sense.*

1:6 26:09:2012 *I have just read the thesis of Reiko Goto Collins it is written so beautifully. The frequent use of "I" and "my" makes it so personal. It really connects the practice with the thesis. It feels so real. I can also see how the aesthetic log has been incorporated into the thesis. This is the sort of style for writing my thesis.*

2.1 01:10:2012 *Looking back at Cooley's work. If the voids were not there it would be a plain dish therefore the voids must have some significance.*

2:2 01:10:2012 *The gaps in the net make it transparent so I can see the items inside the voids from the outside. I can see the contour on the outside caused by the shape of the void space inside. I can see that the inside provides a degree of physical security for the objects from the outside environment.*

2.3 01:10:2012 *In thinking about the work of Aldridge and my practice the ability to see the recycled inclusions inside the glass is a fundamental requirement of my practice.*

2:4 01:10:2012 *I like the work of Urbanowicz because there is confusion as to whether there are voids within his work. Can I call openings that have only three sides a void? If I can, then which side are the voids on? Or am I simply talking about space? If this glass were placed against a flat wall then there would be voids. So there is a relationship between the void and the external contours something which I must explore in my practice.*

2.5 01:10:2012 *The issue of protecting the textile by the use of glass was one of the reasons why I took my practice down this route. I had seen so much textile art that would only last a short time because of its fragile nature and the exposure to dust etc.*

2:6 02:10:2012 *I don't know what it is but the reading of Bachelard and Tao Teh Ching has encouraged me to think more about my practice. It has added something which was not there before. It feels more meaningful. Maybe this is the connection between artist and researcher and significant learning caused by the combination. It is not just about facts it is something deeper than that – the affect on me as a person?*

2:7 20:09:2007 *I want to find out all about Trapunto, not only for the sake of historical context but also to discover the processes used to make it. I hope to learn from these processes to help me make my own artwork.*

2:8 22:09:2007 *I feel some comfort today because I have found a relationship between trapunto and wall hangings. It gives me inspiration to continue with the idea of wall-mounted artworks.*

2:9 27:09:2007 *I found a Women's Dress, c.1820, Silk Dress with a Figured Leaf Design, c.1823 Figure 2.11 Pink Hat, c.1920 all with forms of Trapunto on. Interesting that trapunto was used to give the garment stiffness.*

2:10 24:09:2007 *Sunflower Quilt c.1860 which shows trapunto used as a quilting technique.*

2:11 02:10:2007 *I am so excited today first the link with Florentine trapunto and now the patent application. The link with trapunto and my work continues to grow stronger. Both allow an opaque background to be inserted.*

2:12 02:10:2007 *Recycled? Feathers, yarns, rags, woollen blankets, rice, and beans. Once I have learnt how to create the voided form some preliminary experimentation is needed to determine the type of inclusions and their aesthetic qualities.*

2:13 02:10:2007 *Layering and Slitting would require me to make openings in the back of the glass and then somehow be sealed. Given my past failures of fusing holes this would be a very high risk strategy. I can see how access from the side would work but this would mean that all forms would need an open edge. So I could not do a circle. Guess that would not be a problem. Best to start with side access first and tackle circles later if needed.*

2:14 04:10:2007 *Van den Burghr research is really useful it goes beyond the normal explanations of the trapunto technique and in my mind I can see how it would relate to my work but I need to carry out some experiments... Not only will I have to think about the material types of inclusions but also their size and how I manipulate them.*

2:15 10:10:2007 *Kolb experiential learning means Concrete Experience - Reflective Observation – Abstract Conceptualisation – Active Experimentation. This means that I put glass into the kiln, fire it, take it out, observe and reflect on what has happened. I then try and make sense of what has happened and based on these findings do another experiment. Problem - I might be lucky and find the real cause during the first experiment. I might go around and around this cycle forever not finding the cause, because I do not have the knowledge in the first place. In my case this would be extremely costly in terms of glass and time. What I need is some guiding information in addition to the experiential learning.*

2:16 19:10:2007 *I have found it thanks to Cummings - core forming a process that used cores to create voids within vessels. The vessel shape is irrelevant the process of core forming is what matters. Another historical context - so what is core forming all about - what is the process?*

2:17 19:10:2007 *Cores to produce voids! That is what I need to do - but how?*

2:18 21:10:2007 *The core material must not stick to the glass. This would mean that any core material could be used as I would not have to be concerned with COE.*

2:19 21:10:2007 *The core material should be flat so it could be applied in strips to stop the glass slipping in the kiln.*

2:20 06:11:2007 *The vessel was broken showing the inside. Had it been cleaned? It looks like it had been stained by the core material or the binder.*

2:21 09:11:2007 *Kiln temperature 800ºC Insulfrax Paper could not be removed and caused staining. Isofrax Paper, Kaowool 1206 Paper and Kaowool 607 all left significant woven textures inside the void. Fiberfrax Ceramic Fibre Paper and the Fiberfrax Duraboard, no staining, held their form well, relatively easy to remove, slight traces of texture. It is more economical to buy the 5mm Fiberfrax Ceramic Fiber Paper by the roll.*

2:22 13:11:2007 *Desag Artista completely clear with no imperfections within the glass. Baoli, green tint around the edges of the voided forms. Bullseye, Uroboros and Spectrum good degree of clarity but no data...*

2:23 16:11:2007 *Well that is interesting the technique described by Cummings relates to glass fusing. Same as my work except that I am working with larger pieces of glass in sheet form.*

2:24 16:11:2007 *From the side I see four internal voids and how their form clearly affects the outside contour of the top surface. I see further complexity in that the inside of void on the bottom layer affected its outer profile which in turn affected the outer profile of the inside of the void on the top layer which in turn affected the outer contour of the top surface. It is easier to describe the voids in terms of being and non-being rather than inside or outside for example, it is the non-being (both layers of voids) which determine the being (contour) of the top surface. I can see several faults in the structure of the glass associated with weak web sections and poorly defined edges. This is not going to be easy it will require a lot of experimentation to get it right which needs to be translated into a set of principles that I can use within my practice.*

2:25 13:12:2012 *Void form, because I can have organic, geometrical, figurative or non-figurative shapes with various depth and width. Void spacing, because I can have varying amounts of space between voids. Void layering, because I can have voids positioned in the top layer relative to voids in the bottom layer.*

2:26 18:11:2007 *Thinking about the firing schedule which is critical to my research, there are three problems. The first is that there are no firing schedules for Fiberfrax, which is an insulator of heat, enclosed within glass. The second is that I do not know how the combinations of void shape, spacing and layering will affect the firing schedule. Thirdly, the process that I am trying to achieve is a single firing process whereas fusing and slumping is usually a two stage process.*

2:27 19:11:2007 *I foresee another problem. Slumping glass at high temperatures alters the viscosity of the glass causing it to flow more freely due to gravity. What does this mean for the rise and falls of the void forms – glass too thin on the top?*

3:1 05:01:2013 *The colour makes the void forms, spacing and layering more visible. I see two compositions, one caused by the colour within the voids and the other by the void forms themselves. I see many colour contrasts within each void, across each layer of voids and between the upper and lower void layers. The colour varies as a result of the inclusion type and its texture. I particularly like the way the different sized inclusions are fragmented and juxtaposed - pointillism comes to mind. At a distance the fragments merge into a whole and the texture is lost. The folds and creases create a visual effect that would be impossible to paint. The glossiness of the glass surface makes the colours seem more vivid than they really are. I see reflections and shadows caused by the void forms which cause slight variations in colour and sparkle. Overall the piece looks bright, clean and crisp.*

3:2 09:01:2013 *I see contrasts of hue, colours which are analogous (various yellows) and complementary contrast (yellow against violet). I see light and dark contrasts between the layers and within each void. I see the warm colours of yellow advancing and contrasted with the cold violet receding I know there to be contrasts in saturation as some of the inclusions were dyed by me. I like the way that the small quantity of yellow material in the central void immediately draws the eye.*

3:3 12:01:2013 *This is one of the best photos I've seen. It shows the strongest contrast based on the hues of yellow, red and blue.*

3:4 12:01:2013 *I can see how the matrix positions relate to hue contrast. If the hue contrast combines with the inclusion type within voided form, space or layer, combinations 1, 10 and 19 could be affected.*

3:5 15:01:2013 *I see positive and negative spaces and spaces on the canoe filled with cross hatchings or inclusions.*

3:6 03:06:2008 *(Interview with Adams) There was a little story that I quite liked. Bertrand Russell told a story. He asked a child who had done a painting, how do you paint what do you do? The child replied I have a think and then I put a line around my think. And that was his explanation about how he painted. Cezanne also said the white on a canvas is probably the most important colour in your whole thing so be careful how you treat it.*

3:7 15:01:2013 *Russell and Adams have meaning for my practice. I see glass void forms of the sample have outer edges that create distinct lines - a repository for my thinking. They also separate the different types of inclusions from the most important white background space. I can see how this aspect of light/dark contrast has potential to affect the combinations 1 and 10 of the matrix in terms of inclusion type, glass voided form and the spacing between the void forms. The white space of the background must be treated with equality within my artwork.*

3:8 16:01:2013 *Absolutely perfect example of light/dark contrast effect creating foreground and background planes. It also shows that each plane has minor light/dark contrasts but not so much as to confuse the distinction between the planes.*

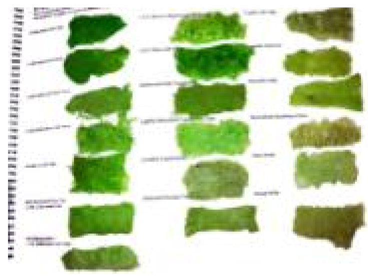
3:9 16:01:2013 *There is a light/dark contrast between upper and lower layer voids. The colour combines with the glass layers to make two separate planes. It is clear that texture affects the colour in my work but it is not on the surface as the glass is smooth. Inside there are nooks and crannies created by the manipulation of the inclusions. The walls of the voids force the inclusions to go a particular way. Each inclusion type has its own surface texture and the chopped size of the inclusions create a flaky textured effect.*

3:10 16:01:2013 *I can see how inclusion type, size and manipulation within the voided form affect combinations 1, 2 and 3. Combination 12 void space determines the width of the voided form that affects the manipulation and light/dark contrast. Combination 21 separate layers form planes.*

3:11 19:01:2013 *Michael Adams Jardin Du Roi the Bamboo has really strong saturated colours.*

3:12 03:06:2008 (Interview with Adams) ... *but if you put Green next to Blue you get a vibrancy and if you put a Alizarin Crimson against Black then you have a vibrancy again and it is not dead, everything has to, everything is radiating and is in a state of flux...*

3:13 02:01:2008 *Using different kinds of silk fibres I applied saturated leaf green acid dye. I then wrapped each bunch of fibres with cling film and placed them in the microwave for 10 minutes to set the dye and to enhance the colour. The dye absorption of different silk fibres affects the saturation of the colour.*



3:14 19:01:2013 *Saturated inclusion colours in single voided forms, across voided forms and different layers represent matrix combinations 1 and 19.*

3:15 21:01:2013 *Nick Maley's work Harbour Lights has Warm colours advance whilst cool colours recede.*

3:16 21:01:2013 *Cold/Warm contrast - inclusion type and colour within the voided layers have potential for enhancing depth, combination 3. Also the colours of the background void space and void layers, combinations 19 and 10 respectively.*

3:17 03:06:2008 *(Interview with Adams) You see, all colours are not even, some colours have the ability to stand out and sing loudly to you. Some people say that you should achieve balance in the painting but I tend to emphasis specific colours, it attracts people to my paintings.*

3:18 24:01:2013 *Michael Adams painting of the Botanical Gardens - The small areas of reds show the effect of contrast of extension well.*

3:19 24:01:2013 *Fragmented inclusion size and positioning within the voided form and layering, void spacing by virtue of its area. Combinations of 2, 11 and 20*

3:20 19:05:2009 *(Interview with Harrison 2009) So pink looks fantastic with a bit of orange and a bit of mauve and then you whack in some complementary colours so if you're using red then it will be green. But instead of using green you would use a light version. So it works with any good colour combo. So you take a bit of yellow and add a bit of orange that looks a bit like red then you can have green that's a bit turquoise then you have a purple mauve. And that always gives you a good colour combo. Makes it really zingy.*

3:21 24:01:2013 *Complementary contrast colours, inclusion type, voided form, space or layer, combinations 1, 10 and 19.*

3:22 26:01:2013 *I can see the potential for enhancing colour harmony by combining the inclusion type hue with void forms, layers or spacing. Coloured inclusions in single void forms or across the voids within a layer or between void layers also have the potential to produce colour harmonies. Furthermore, coloured glass could be used for background void spacing and the inclusion colours offer a greater potential for colour harmonies. These harmonies represent combinations 4, 13, and 22 in the matrix.*

3:23 28:01:2013 *Carole Waller's Shadowy Figure in Landscape - Grey and the pale coloured background are vertically parallel giving the effects of lightness and height.*

3:24 21:10:2009 *(Interview with Waller) Depth is important to my work it can be achieved in many ways but I prefer to use the transparency of the material and physical gaps between layers to produce it.*

3:25 28:01:2013 *Jane Reeves, Porthmeor Calm - I love this piece the horizontal waves and graduations of colour give it both width and depth. Just look at the depth of blue.*

3:26 28:01:2013 *Tilly Willis watercolour - The vertical position of the tribe person and the tree intersects with the horizontal planes of the field, mountains and sky resulting in a point of focus that draws the eye of the viewer. There is a sense of vastness of space and balance within the painting.*

3:27 28:01:2013 *Lois Brezinski, Rum Point Club - Nice shades of colour along the pebbles which draws the eye along the beach as with the roots of the trees. The diagonal of the boat also points to the tree roots.*

3:28 28:01:2013 *Burnside and Beadle's Enigmatick Funktication - The eye begins to search the painting then gets drawn to the circular areas which seem to move. Once noticed the eye keeps returning to these circular forms.*

3:29 28:01:2013 *Paul Smith's Swirl Print Scarf - My favourite textile design - the rhythmic flow of colours. It is peaceful and makes me want to keep looking at it. Designs need not be complex. What is also interesting is that you can see/imagine the design even when folded or around your neck.*

3:30 29:01:2013 *On direction and movement there seems to be several possibilities of potential enhancement here with inclusion manipulation combined with the glass void forms, spacing and layering. Inclusion manipulation vertical, horizontal, circular or rhythmic could directionally compliment the voids or not. The physical gap between layers noted in Waller's work could also be replicated by the glass layering combined with the manipulated inclusions. The manipulated inclusions could run parallel to the void form separated by void space to create rhythmic flows as demonstrated by the work of Paul Smith. These aesthetic qualities represent matrix combinations 6, 15 and 24 respectively.*

3:31 01:02:2013 *(Figure 3.1 Sample) The inclusion size represents patches of colour therefore simultaneous patterns have the potential to exist. The occurrence of simultaneous patterns could be numerous because of all the possible combinations of void form and layers. Itten's diagrams shows background space between the colour patches similar to that of Figure 3.1. Matrix combinations are 5, 14 and 23.*

3:32 10:02:2013 *Why colour optics? Well I suppose it begins with my school days all of which were spent in the grounds of Worcester Cathedral. Every morning I would walk along the north cloister and look up at the stained glass that depicted Chaucer the author of Canterbury tales, and Wycliffe who translated the bible into English. I noticed how light made the colours vibrant, which changed throughout the year.*

I made a connection between transmitted light and Carole Waller's Shadowy Figure In Landscape (Figure 3.26 in thesis) which comprised of two hand painted silk canvases one hung in front of the other and backlit by natural light from the window behind. As I looked at the installation I realised that each image was only temporary as I saw different hues, combinations of transparency and opacity, markings and perspectives as the installation gently moved with the turbulence of the air within the room. My eyes strained in an attempt to hold each image and in doing so I became totally isolated from other events in the room.

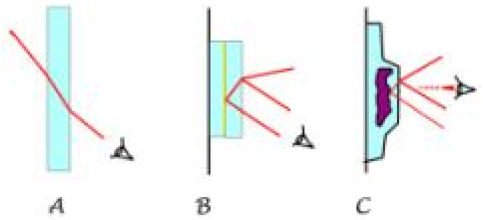
I was in the Cathedral one day trying to find a section of broken medieval floor tiles which I could not find so in desperation I brought a guide book. On page 19 I noticed a brass depicting the images of the daughters of Prince Arthur's steward which I liked very much so I sought them out. Just as in the book the light reflected off certain parts of the brass but it was as *though the heavenly light was part of the image. (Brass Reflection in Sutton, 2004: 16)*

Finally, in studying Frank Stella I realised that light and shadow cast by illumination was an integral part of the visual experience and not separate from it.

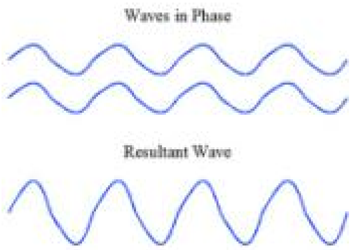
3:33 10:02:2013 *The problem is that most galleries hang paintings on the wall with non-specific illumination. Whilst I can trace back through Itten and Albers to Goethe they only explain light in the most general terms. I need to find something more specific.*

3:34 11:02:2013 *(Figure 3.1 Sample) The glossiness of the glass surface makes the colours seem more vivid than they really are. The colours of the recycled inclusions look different outside compared to when they are inside the glass. They look different again in daylight and under artificial light. The colour changes as I move around the sample from being highly vibrant to less vibrant and finally to almost unrecognisable as the reflection stops me from observing the colour. If I hold the sample in front of a window all I see is bright light through the transparency of the void space and the detail and colour within the voids appears black. If I place the sample onto a white background and reduce the light I still see the texture within the voids but the quality of the colours change. The further I move back from the sample the more the texture and boundaries seem to fade.*

3:35 12:02:2013 *Figure A shows the light refracted ray through a stained glass window. The light source originates from the rear then refracts as it passes through the glass before being observed by the spectator who is inside the glass and below the position of the window. Figure B represents a tesserae with gold foil sandwiched between two layers of glass. Here the light sources and spectator are on the same side of the glass and whilst refraction takes place as light passes through the glass the eye observes reflected rays from the back and the front of the glass, which account for some of the colour differences. Figure C represents the voided work of my practice. The only difference between Figures B and C (apart from their type) is that the eye line when viewing my studio work would be more horizontal given the position on the gallery wall.*

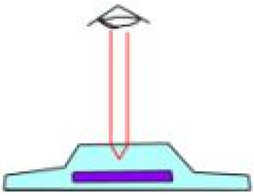


But why does the colour increase? Biglow (2013 Online) The two reflected waves in B and C are perfectly in phase (to simplify the explanation, these waves have the same wavelength). When the waves are in phase, the crests and troughs of the waves align with each other. When this happens, the waves reinforce each other to produce a new wave which has higher crests and lower troughs. In other words, the waves add together to produce a new wave



that is twice as tall as the original waves. Thus, the new wave is bigger, and the colour from the wave is brighter. This is called constructive interference -- the waves constructively interfere with each other to produce a new, stronger wave.

Refraction causes the depth phenomenon - the eyes perceive the light rays, which both refract and meet above the actual depth of the inclusion. Given that the maximum thickness of glass is at best 3 mm the apparent depth is very small making it difficult to perceive any thickness.



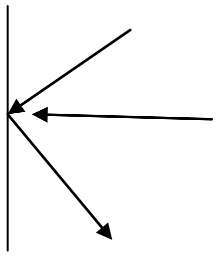
3:36 15:02:2013 *The colours from some manufactures are just too luminous compared with those from Desag Artista and overpower the inclusions... The colours of the inclusions are heightened when inserted into the glass voids. The entry draws attention to the potential of enhanced colour caused by the glass, both in terms of the inclusion type within the voided forms and their contrast with void space if the background comprised of coloured glass. Where the third layer of glass does not include a void form it creates an added thickness to the first layer and void form which also alters the refraction of the ray of light. These aesthetic qualities represent combinations 7, 16 and 25 respectively in the matrix.*

Tray 2 Coloured Bullseye (Firing Schedule Appendix 9)

Tray 3 Coloured Spectrum 96 (Firing Schedule Appendix 10)

Tray 4 Uroboros Dichroic (Firing Schedule Appendix 11)

3:37 12:02:2013 *The top light source reflects an equal angle however if I am not at the end of the reflected ray but horizontal as shown this means that I am not getting the full light intensity and therefore the colour would look duller. The reflective qualities of the inclusion type could add to the intensity of colour. The manipulation of the inclusion in terms of the angle it forms within the void or layer could also affect the intensity of colour. The angle of viewing and the angle of reflection caused by the void form, layer or coloured background space could also affect the intensity of the colour. These aesthetic qualities represent combinations 7, 9, 16, 18, 25 and 27 in the matrix.*



3:38 16:02:2013 *(Figure 3.1 Sample) At a distance colours seem to merge, it is as though the edges of the coloured inclusions soften, it prevents me from seeing the original colour. I see a different colour more intense I think. The boundaries of the large inclusions do not disappear. The edges of the voids are particularly interesting from above I can see boundaries all around the contours of the voids. I think I am seeing the edge of the glass as it falls away due to slope of the void form. The boundaries that appear as light grey are most significant with the violet colours perhaps because of its light/dark contrast. When I view the sample from different distances I lose sight of the void boundary but the plastic effect tells me that it must still be there. It seems that the void boundary is also affected by the size and manipulation of the inclusions the finer the inclusions the more pronounced the boundary.*

3:39 16:02:2013 *(Figure 3.1 Sample) "The fragmentary nature of the various sizes of inclusions in the void form and layers allows for a range of optical mixing by size and colour. There is also potential to reduce the background space to an absolute minimum so that the area covered comprises mainly of inclusions. This would allow optical mixing to take place between the inclusions within the voided forms and the colour of the background space. These aesthetic qualities represent combinations 8, 17 and 26 in the matrix."*

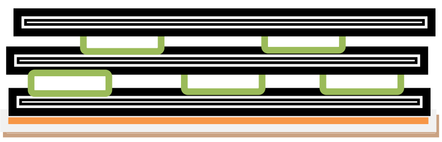
4:1 06:08:1994 *(Meeting with Adams) ... He asked me to look at a dark green leaf and then held it up to the sunlight so that the colour changed. He explained that the ultraviolet light was so strong in the Seychelles that it seemed to penetrate the leaf whereas in England the light is reflected from the surface of the leaf...*

4:2 20:02:2013 *I am aware of a tension, how I combine the roles of structured making of the glass with the freedom of producing art. I suppose I am talking about the roles of designer-maker and artist-maker.*

4:3 20:02:2013 *The experiential learning cycle has never had deep meaning for me it seems like an obvious statement. I like the idea of how Dewey defines experience, it is not just any experience it is one which has a definite starting and ending point, a conclusive experience.*

4:4 20:02:2013 *Dewey's model fantastic! Everything has fallen into place in the space of 10 minutes. Each cycle represents an experiment and a conclusive experience. The impulse represents the inspiration and past learning. My observations. How it ties in with previous knowledge of core forming, trapunto and colour theory. How I make judgements about my work and how I move forward to the next experiment and in general with my practice. Each stage can be articulated and entered into my aesthetic log which in turn provides the basis for my thesis. Great!*

4:5 27:11:2007 *Preliminary Experiments - The Basic Glass Stack The basic stack configuration consists of three layers of 3mm glass separated by two layers of 5mm thick Fiberfrax strips resulting in 2 layers of voids within the glass. Whilst the number, width, positioning and spacing of the Fiberfrax would be variable the basic stack configuration be used for the remainder of the research study.*



Preliminary Experiment 1 (2007)
Multi-layered Voids, 33cm x 22.5cm
(Firing Schedule Appendix 13)
The Fiberfrax strips on the bottom layer were wider than those on the top layer. In addition the positioning of the top layer strips meant that they crossed the bottom strips so that voids did not interfere with each other except at the crossover. The stack was placed in the kiln and heated using the firing schedule with an amendment to segment 2 which increased the hold time from 10 minutes to 20 minutes to compensate for the additional glass layer. Two observations can be made about the front edge. The first is that the lower void edges are straight but the top void edges are uneven and rough. An observation of the rear face shows

that where the voids cross, the bottom void had not closed off properly allowing the blue inclusions to interfere with orange ones. This was caused by an incorrect firing schedule. The side view shows very thin web sections which resulted from too much viscosity flow of the glass or the relative positing of the top and bottom void layer strips. Furthermore it was found that the organic shaped voids provided for ease of removal of the core material and insertion of the inclusions.

4:6 29:11:2007 *Preliminary Experiment 2*
Multi-Layered Voids, 25.5cm x 25.5cm
(Firing Schedule Appendix 14)

The positioning of the void strips was wider and a firing schedule amendment of segment 2 was made to decrease the process temperature from 820°C to 810°C. This prevented the overheating of the top void edges. Similar observations can be made about experiment 2 in terms of the straight lower void edges of the front edge. However, the top void edges were still uneven and rough but less than the previous experiment. Observation of the rear face shows that the bottom void had not closed off properly allowing the purple inclusions to drift across the yellow as shown by the arrow. This situation had deteriorated compared to the findings of the previous experiment suggesting that the heat was not getting to the lower layers of the glass. The side view shows a collapse of the top glass layer (indicated by the right arrow) resulting in a very thin web section caused by the upper void overlapping the edge of the lower void. However, where the upper void does not overlap the lower void (indicated by the left arrow) the web section is much thicker.

4:7 01:12:2007 *Preliminary Experiment 3*
Multi-Layered Cut Voids, 23cm x 23cm
(Firing Schedule Appendix 14)

What is causing the poor top edges? Top voids were cut short before the intersection with the bottom voids. No overlapping voids, top edges visible right across the top face as opposed to just the edges. Outcomes: top edges of the voids remained extremely poor; Heat causing the glass to flow across the upper voided area and down its sides due to gravity, drawing the thickness of glass away from the top surface of the void and making it very thin. The thin layer of glass was creeping back from the edge of the void strip causing the rough and fragile edge.

4:8 03:12:2007 *Preliminary Experiment 4*
Multi-Layered Voids, 23cm x 25.5cm
(Firing Schedule Appendix 14)

The experiment considered complex layering of relative void positions and closer spacing. The third layer 1cm larger on each side than the two lower layers of glass. The rationale being that any creep back would be less than 1 cm resulting in a thickness of glass suitable for cold working. A brown coloured base layer of scrap Bullseye glass was used to make it easier to observe the outcomes. The outcomes produced much better top edges than any of the previous experiments. A further significant observation was made, it was noticed that small distances between voids did not allow the glass to fuse down properly because of the lack of surface area to do so. The crack visible within the glass was due to incompatible glass types namely Artista over Bullseye.

4:9 04:12:2007 *Kiln Used for Preliminary Experiments. Moving forward to larger sized glass will require a new larger kiln, with top heating elements and one which can handle very sensitive firing schedules.*

4:10 07:12:2007 *Electricity supply people came today and updated the electric circuit. Left - new main fuse unit with 100amp fuse. Centre - new dual meter for day and night operation Right – RCB circuit breaker for Kiln*

4.11 12:12:2007 *Electricians came today and dug the garden up and laid a massive 25 metre cable to the kiln shed. I have never seen a cable so thick!*

4:12 17:12:2007 *Northern Kilns came today and delivered the kiln. It came in many parts the largest being the size of a double bed! Getting to the kiln shed was a bit of a struggle but we got there in the end. It went through the doorway with only inches to spare.*

4.13 17:12:2007 *Kiln has been put together it looks massive. The 5 thermocouples create three distinct zones within the kiln.*

4.14 18:12:2007 *Northern Kilns came back today and completed the wiring and tested the kiln. Yippee it works! I feel so relieved.*

4.15 19:12:2007 *Every time the breaker turns the power on the lights dim in the house. This happens about every second, it is like a disco in here. Looked on the net, it's something to do with the phasing of the electricity what the hell is that? It states that it can affect the whole street. Not only that, it makes a loud bang as well when it switches in and out... Relief it does not affect any of the neighbours lights... Talked with soundproofing company today, did not realise that soundproofing was so complicated. I need three lots of different materials one to stop vibration of the metal, one to stop it going through the floor and one to dull the sound and a wooden case around it... Cannot do anything about the lights dimming except turn them off when the kiln is on....*

4:16 04:01:2008 *Hand Dyed Cotton Swatches*
(Appendix 16)

I identified dye formulas for cotton material. I then created my own colour reference box of cotton colour standards for the early experiments of the research experiments. It has taken 5 days to work the dye recipes out and finish the box of reference swatches. At least I now know roughly what I need to do should I require a specific colour.

4:17 11:01:2008 *Hand Dyed Silk Fibre Reference Box*
(Appendix 17)

Material: Cultivated Silk Laps
Acid Dye Solution = 1 gram per 0.5 litre + 5mls White Vinegar
LY = Lemon Yellow (George Weil) GY = Golden Yellow (George Weil)
RB = Royal Blue (George Weil) BG = Bright Green (George Weil)
N = Navy (Jacquard) T = Turquoise (Jacquard).
Colour Setting in the microwave.

4.18 13:01:2008 *Samples In Aesthetic Log*

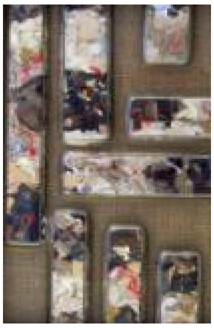
Gluing the inclusions into the aesthetic log is not working. They look nothing like the inclusions within the voided forms. Also the background is missing.

4.19 17:01:2008 *Single Layer Samples (Firing Schedule Appendix 15)*

What is needed here are real samples those which show the types of inclusions within the voids and the backgrounds. I have lots of scrap glass from which I can produce single layer samples... The aim of the samples would be to identify potential combinations of inclusion types and backgrounds. 30 samples were produced with a maximum surface area of 345cm² each comprising of two layers of clear glass (with the exception of one blue glass base). Fiberfrax strips were inserted between the layers resulting in a single voided layer. Opened kiln today ... removed sharp edges with diamond pad (18:01:2008) removed core material from 10 samples today (19:01:2008) ... another 10 today (20:01:2008)... finished last 10 today (21:01:2008). Collected inclusions from all over the place today... stuffed 10 samples today (22:01:2008) and placed on background (I like doing this). Read all about framing today (23:01:2008)... Went and got framing materials from Lions today (24:01:2008) ... frame with deep rebate... D rings, cord, tape, screws and a frame gun. Cut 30 frames today with mitre jig and saw (26:01:2008)... purchased a second hand underpinner off ebay today (02:02:2008) ... glued and pinned 30 frames (05:02:2008)... hand painted frames today... (07:02:2008) painted second coat today (08:02:2008)...Mounted and framed 10 samples today (09:02:2008)... another 10 today (10:02:2008)... finished remaining 10 today (11:02:2008). Hung them all on gallery wall and photographed each one... printed off photos today (13:02:2008) and stuck in aesthetic log... why am I sticking these photos into the aesthetic log... I will just refer to digital images... save a lot of time and removes costs of printing.

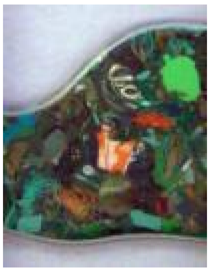
4:20 14:02:2008 *The use of patterned textile backgrounds complicated the design to the extent that they drew the eye away from the focal point of the inclusions. In addition any design would have to take into consideration the position of the voids and the precise positioning of the fabric pattern.*

4.21 14:02:2008 *The use of plain fabric backgrounds such as hessian could be used to compliment the colours and texture of the inclusions. However, for best effect the hessian needed to be stretched taught around a stiffened backboard and well secured. Furthermore, it was found that fabrics with close weaves were best suited as more open weaves tended to take the eye away from the focal point of the voids and inclusions.*



4:22 14:02:2008 *The use of coloured silk paper proved to be an effective background. However, sheet size would prevent it from being used on larger pieces of work.*

4:23 14:02:2008 *The use of plain white cotton fabric proved an excellent background material as it appeared clean and crisp and gave maximum definition to the void shapes and inclusions within them. However, the fabric had to be stretched taught and would loosen overtime. Conservation or museum quality mountboard could be used as a substitute overcoming the problems associated with stretching and would also have more resistance to yellowing over time.*



4:24 14:02:2008 *It was found that by adding a transparent blue glass base layer over a white mountboard background the contrast of the voids and inclusions were enhanced. However, any design using this approach would have to consider the balance of the composition in terms of the vibrancy of the coloured glass compared to the voided inclusions.*

4:25 14:02:2008 *It was found that by adding inclusions consisting of chopped fabric, a flaky effect could be produced. It was noted that finer chop sizes did not give a flaky effect but increased the impression of detail.*

4:26 14:02:2008 *It was found that by adding inclusions consisting of silk fibres a better colour blending could be achieved. Furthermore, silk fibres were much easier to insert and their placement could be more accurately controlled. Silk fibres also gave a better illusion of softness.*

4:27 14:02:2008 *In addition to adding chopped fabrics and silk fibres it was discovered that it was possible to include found items that invoked the memory or added a degree of realism to the artefact.*

4:28 01:01:2008 *Experiment 1*
The main inspiration for experiment 1 came from a painting by Michael Adams entitled "Northolme" in 1987 which has the lovely blue hues and white caps of the Indian Ocean around the Seychelles. I also like how the wave forms are depicted. The outer forms filled with lines of detail. Perfect, this matches void forms and inclusion detail.

4:29 01:01:2008

Experiment 1 Design and Composition	
Size	57cm x 25cm
Narrative	Seychelles/Ocean
Void Form	Organic wave shape
Void Spacing	Increased towards top of artwork
Void Layering	Two Horizontal
Colour Reality	Northolme Painting
Colour Scheme	Blue and White Graduated
Inclusion Type	Aida cloth, lace, cotton, calico, tape, organza, cotton wool and hand dyed silk fibres
Inclusion Size	Medium
Inclusion Manipulation	Random
Background	Ice White Board
Inner Frame	Bianco Matt White
Outer Frame	Bare Obeche Hand Painted
Hanging	No 4 Picture Cord
Signature	Trapunto Medallion

4:30 27:02:2008 *The ocean is a major inspiration in my life. I wanted to depict this in my work. Noticing the natural yet ever changing curves of the waves, the colour blends within the water and the flow of the current. I feel this piece does not achieve any of these three things. The proportions do not suit the theme. In my mind, the ocean is a long vast horizontal open area of water. My brain is telling me there is something wrong, it just does not look or feel right. The sides need to be extended horizontally. At the moment it's vertical and I don't like it. Really disappointing.*

4.31 21:12:2007 *My Artista glass arrived today from Pearson's, they were massive and difficult to handle. Each of the 4 sheets measured 1 m x 1.7 m. I planned out the first sheet for the first two experiments and tried to cut the glass. To say that I am nervous is an understatement if I mess up I lose £100 per sheet. I laid the glass on the living room floor, placed a piece of wood across the width and positioned myself so I could drag the cutter across the glass. The width of the glass made my positioning awkward. As I dragged the cutter across the glass the wood slipped slightly and the sound of the cutter changed as it moved towards the edge of the glass. I knew then that I had messed up. I placed the wood under the glass and tried to break the glass. The glass broke in all directions I was so despondent. I took a piece to the local window glass supplier (22:12:2007) and asked for his help but he couldn't cut it either. He said the best option was to buy a builder's square and a new cutter from B&Q which I did. I tried cutting a second full sheet the builder's square moved and the same thing happened the glass broke in all directions (23:12:2007) I was reduced to tears after losing two full sheets of glass worth £200... I went to Stourbridge Stained Glass and told them what had happened (23:12:2007). They were so helpful. The first thing they said that cutting glass for fusing on this scale is much more difficult than ordinary glass so you have to have the proper tools. The tools that I had purchased were useless. They sold me a set of tools, the set square had blue clips to grip the glass to prevent it from moving, the cutter was oil filled and made from brass apart from the cutter head. The weight of the cutter provided most of the pressure for cutting the glass. A pair of glass running pliers to split the glass once it had been scored. A pair of grozing pliers to remove the bits of glass that do not separate. They instructed me how to cut the glass and let me practice on small pieces gradually working up in size. I felt my confidence slowly returning. Before I left the shop they gave me two bits of advice never cut glass when it is cold and always score on the smooth side... I left a sheet of glass overnight in a warm room and tried again. It worked, I felt so pleased with myself (24:12:2007) ...*

4:32 08:01:2008 *A technical disaster these edges are way too thin, brittle and sharp. I will cut my hands to shreds trying to stuff the insertions... Today I have purchased a tile cutter (09:01:2008)... This is hopeless the top layer keeps breaking off... You only have to twist the glass slightly and the top layer flies off... I have done it but the width has been reduced to 14cm nearly half the size of the original!*

4.33 23:02:2008 *Everything about the void shapes are wrong. The curvature, the angles, the placement and the spacing, are all just so wrong. It's as if the voids are fighting against each other. There is no rhythm, no flow, no fluidity. The top void forms are in discord with the bottom void forms. The top and bottom void layers have not aligned with each other. I think it's the positioning and the placement of these void forms that have spoilt the overall look. Spacing plays a big part in the downfall of this piece. Unsightly white gaps glare out at you. Not helped by the discord of the void forms. I feel I have this constant need to go up and fill the gaps in with colour!*

4:34 23:02:2008 *What I cannot understand is that throughout the process the wave forms looked really good. It was not until the final piece was hung and viewed that they looked awful. Investigating this I decided to digitally split the image into void space (background), bottom void layer and upper void layer. Immediately I could see the problem the void forms were dreadful... the void spacing is all over the place... I need to be much more precise in the cutting of the fibreboard both in terms of void forms, the background void spacing and void layers and how it all fits together.*

4:35 26:02:2013 *I am happy with one aspect of this piece! The colour blend and graduation of the colours might not be spot on for my liking but the inclusions themselves have served their purpose well. I love this idea of chopped up recycled matter, mixed together and pushed into a contained space. The textiles mould themselves in the voids beautifully. From a distance the colours are one, whites blending into light blues followed by mid tone blues and finally into dark blue and navy tones. But on closer inspection you can see that the 'whites' are actually a mixture of whites, the 'light blues' are a blend of multi coloured blues and so on.*

4:36 26:02:2013 *Experiment 1 Matrix Positions*
3 Light/Dark Contrast (Void Form and Inclusion Manipulation)
9 Reflection and Colour (Void Form and Inclusion Manipulation)
21 Light/Dark Contrast (Void Layering and Inclusion Manipulation)
24 Colour Direction (Void Layering and Inclusion Manipulation)
26 Optical Colour Mixing (Void Layering and Inclusion Size)

The angle of reflection caused by the twisting of the fibreboard strips is clearly visible. The lower edge of the void dips into the lower layer of the glass and gives a double edge. Depending on the viewing position the angle of reflection will differ considerably.

4:37 25:01:2008 *Went and brought the inner and outer frames today... tried measuring my piece... the 3D nature of the work makes it very difficult to measure... need some kind of jig to measure it with... designed jig today on paper it should work... Went and got parts for jig today (26:01:2008) ... Made jig today it works great (26:01:2008) ... Now I need to cut this mitre at 45 degrees on inner white frame... white is chipping off... Went back to Lions today told them about chipping (28:01:2008) ... they said you need a guillotine to cut this type of frame not a saw... brought guillotine off ebay today... collected guillotine today from Norfolk (08:02:2008)... guillotine not cutting very well... took blades off guillotine and took to Lions for sharpening today... Blades are no good cannot be sharpened... brought new set of blades (09:02:2008) ... cuts perfect... tried to underpin frame today... mitres will not close they leave a dark line... Went to Lions today explained problem... Brought more accurate underpinner (13:02:2008)... works great assembled frame... glass just fits... problem rebate is not deep enough... need to make third frame to increase rebate depth... Got strip of wood from DIY shop today and made inner frame... glued and screwed it to inner frame... Went to Lions today and got ice white mountboard for background (15:02:2008) ...cut it to size... Silicon sealed edges of glass... placed work within modified inner frame... need some means of stopping glass movement within frame... filled gap between glass and frame with silicon and let dry... Great, the silicon acts as a cushion for the glass... Went and got board for back of frame... cut it to size and screwed it to inner frame... Cut and assembled outer frame and painted first coat (17:02:2008)... painted second coat... colour looks too solid... rubbed colour back with wire wool and put clear coat of varnish over it... really like it... Tried to assemble outer frame to inner frame... problem what holds the frame in place?... Went to Lions today (18:02:2008) explained problem... brought some angled pieces of metal... they do the job but I have to trap felt between the clip and backboard because clips are only one size... does not look very professional... Put D rings and cord on and hung on wall (23:02:2008).*

4.38 08:02:2008 *Experiment 1 Technical Principles*
P1 Optimal Top Process Temperature for small sized glass with a surface area between 750cm² and 2000cm²) must be less than 820°C.
P2 Holding times need to be added to segments 1 and 1a to allow the gases to escape from the layers within the glass.
P3 Holding times need to be added to segments 3 and 4 to allow for even distribution of heat within the glass.
P4 Overlapping lower void strips with upper void strips by at least 50% causes the core material to slip during the firing process, altering the reflection angle of the surface of the void form, which decreases the colour intensity if the artwork is illuminated from above.

4:39 01:03:2008 *Experiment 2*
I wanted to capture the essence of the island in much the same way as Adams captures the dense forestation with detail like in Anse Aux Poules Bleu. Hoareaus. There's always so much to look at and to absorb within his paintings, they are never boring or dull, they are full of life and character. I like his use of gold leaf to highlight certain shapes within the work. When light shines over the work, the paintings come to life.

4.40 01:03:2008

Experiment 2 Design and Composition	
Size	23cm x 52cm
Narrative	Seychelles/Rainforest
Void Form	Organic tree shape Wide bottom layer Narrow top layer
Void Spacing	Evenly Distributed
Void Layering	Two Vertical
Colour Reality	Anse Aux Poules Bleus Hoareaus Painting
Colour Scheme	Yellow, green, red, blue, copper, gold
Inclusion Type	Printed cotton, velvet, beads, hand dyed silk fibres, PVC, sweet wrappers, tracing paper, ribbon, fruit netting and aluminium foil
Inclusion Size	Small
Inclusion Manipulation	Random
Background	Gold lame textile
Inner Frame	Bianco Matt White
Outer Frame	Gold Bamboo
Hanging	No 4 Picture Cord
Signature	Trapunto Medallion

4:41 29:03:2008 *Very disappointing, experiment two seems quite tarnished almost a mucky appearance. I have to admit this has to be one of my worse pieces... the finished look didn't work so well. I filled the shapes with copper leaf. I had high hopes for the copper leaf but the final effect was a disaster. The copper leaf picked up ever little imperfection and the rough texture from the fibreboard and highlighted it!... The use of metallic gold lamé textile to cover the background was a big mistake, again every blemish was picked up. The metallic lamé was supposed to highlight shapes, it was supposed to give a warm luxurious feel under light. Instead, when the light shined onto the piece, crinkles and bubbling appeared within the gold lamé background giving unsightly and rather random shadows. The overall look was unprofessional and an amateurish representation of the rainforest... I am not happy with the void shapes. They seem to be all over the place. Too much space between them and some bottom void shapes finished half way across the piece, stopping the rhythm. Apart from the inclusions within the voids, there is not one thing I like about it. The intention was there, it just didn't result in the same way I had hoped.*

4:42 20:03:2008 *I used a new technique whereby I cut out figurative shapes and placed them on the back of the glass stack. The reason - so the glass would slump over these raised shapes and create the notion of looking through a rainforest. This technique worked very well. The glass had slumped perfectly over the shapes.*

4:43 08:03:2008 *What has happened here? The top void edges are a lot better than in experiment 1, but still not perfect. The lower edges have bulged out where there are no void forms – that is the void space. The three layers of glass 9mm in all, have combined to form one complete mass levelling out at 6mm causing the glass to spread beyond the boundary size. I will never be able to cut that with the tile saw. I need a diamond grinder... Today I brought a diamond grinder and 110v transformer (18:03:2008)... I need to connect a water supply somehow to the grinder... the hose is too big to be reduced onto the fitting... Went to the aquarium shop got some different diameters of hose and some jubilee clips... that's fixed it. Need to hold the glass form somehow... trapping the glass on top of a workmate should do it... Oh my God the noise... water is going everywhere... Better if I trap the grinder at the back of the workmate and push the glass onto it... need massive jubilee clip to attach grinder... 8 hours it has taken me to grind both sides... I am freezing cold and I ache all over but I must say it has made a nice job.*

4:44 28:02:2013 *I am happy with the inclusions and the colours. I just would have liked a little bit more. The bottom layer I used thicker voids in the hope that I could create a more dense feeling by inserting and compacting more inclusions. The top layer I went for long thin voids that were placed over the bottom voids... It looked alright - nothing special about it. I had inserted darker coloured tones in the bottom layer, and bright yellows and greens in the top layer voids... Quite pleased with the colour contrast between the two layers... I didn't chop the inclusions as thinly as in the lower void layers which highlighted the inclusion manipulation. The fabric creased and shadows formed... In the top layer, the inclusions were smaller, similar to experiment one. I added seed beads which moulded their way around the other chopped inclusions. It was fascinating watching them move their way through the voids, passing everything that tried to block their path. They were a great success and something I'd use again.*

4:45 28:02:2013 *Experiment 2 Matrix Positions*
2 Light/Dark Contrast (Void Form and Inclusion Size)
3 Light/Dark Contrast (Void Form and Inclusion Manipulation)
6 Colour Direction (Void Form and Inclusion Manipulation)
21 Light/Dark Contrast (Void Layering and Inclusion Manipulation)

4:46 20:03:2008 *Experiment 2 Technical Principles*
P5 The optimum maximum process temperature in segment 2 is 800°C to prevent overheating of void edges and closing of the voids.
P6 Figurative void shapes slumped in the base layer should be left transparent.
P7 The greater the void space the greater the glass mass which, if greater than 9mm will seek to find its own level at 6mm and cause bulging beyond the boundary size of the glass.

4:47 27:03:2008 *There is something very wrong here the aesthetics of these two experiments are absolutely dreadful, I am far from pleased. It feels like I am taking parts of the paintings and trying to test them so that I can claim to have done "proper" research. I am designing my work not creating it from my inspiration. I have to sort this. I feel the inspiration is coming through when I am stuffing the inclusions but it is too late because the voids already exist. It is something right at the beginning of the process. I want inspiration to create my voids as well. Need to work on this before next experiment.*

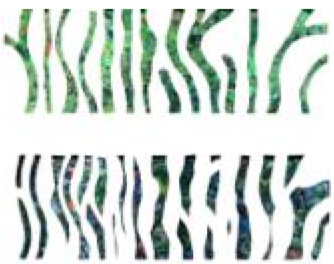
4:48 05:04:2008 *Experiment 3 Inspiration*
When I think of the Seychelles, the image that comes to mind straight away is the rainforest dense and full of colours and forms. On my last visit I recall sitting amongst the trees with nature surrounding me in every direction and new shoots coming up through the enriched soils. I felt the warmth and humidity and my ears were filled with the overwhelming noise from the island's birds, tree frogs and lizards.

4:49 05:04:2008 *I think I will make the bottom layer thicker than the top layer. Why should I just include vertical spaced voids? I want "fork" like shapes as in the rainforest. I want them twisted the same as the trees so I will overlap some top layer voids with the bottom layer voids with what I learnt from Exp 1 and spread them evenly across the piece. I will use the colours of the rainforest as I remember them. Green tones, blue tones and flecks of orange. I want luminous green to light up and show the sunlight catching the leaves. Darker tones on the bottom layer to create distance, lighter much brighter colours on top.*

4:50 03:03:2013 *There is something very different about this piece... it's beautiful. The contrast between the bright and the darker tones are fantastic. I love this colour scheme. Even more exciting are the speckles of orange dip dabbing their way through the trees. The orange gives a certain lift to the green colours. The inclusions were cut quite finely causing a very mottled effect which I liked as this reminded me of all the natural flakes of colour of the tree trunks. Once the voids were filled and the piece was hung under lighting, I began to notice something quite amazing. The light shining onto the piece picked up certain colours, even changing them in some cases. When I moved slightly the light then highlighted another colour and did the same and so on. It seemed the colours within the piece were changing right before my eyes, absolutely beautiful. Not only that, the light highlights the angled edging of the voids causing them to give off a certain 'glow'. The voids remind me of entwining vines, the organic shapes work so well together. The inclusion types and colours mix so well together and give a great colour contrast between the two layers. And the white background creates a crisp freshness to the overall look and aesthetic of the piece. A beautiful piece, that reminds me of my time and feelings when I was in the rainforest.*

4:51 03:03:2013 *Experiment 3 Matrix Positions*
2 Contrast of Extension (Void Form and Inclusion Size)
7 Transparency and Colour (Void Form and Inclusion Type)
7 Reflection and Colour (Void Form and Inclusion Type)
8 Optical Colour Mixing (Void Form and Inclusion Size)
9 Reflection and Colour (Void Form and Inclusion Manipulation)
10 Light/Dark Contrast (Void Spacing and Inclusion Type)
19 Contrast of Hue (Void Layering and Inclusion Type)
24 Colour Direction (Void Layering and Inclusion Manipulation)

The digital separation shows hue contrast between upper and lower layers. The detail shows the nature of the three dimensional surface.



4.52 18:04:2008 *Experiment 3 Technical Principles*
P8 Larger widths of glass require an extension of the stress annealing hold time in segment 4 of the firing schedule.
P9 Overlapping lower void strips with upper void strips by at least 50% causes the core material to slip during the firing process, altering the reflection angle of the surface of the void form, which increases the colour intensity if the artwork is illuminated from the side.
P10 The top void layer can be positioned internal, external or overlapping the perimeter of the lower void layer. Top layer void form can meander across more than one lower void form or it could be contained within its perimeter and bisected.

4:53 03:05:2008 *I feel so good about what I have done. I want to go back to the Seychelles so I can absorb the atmosphere, paint, sketch and return home full of inspiration for more artworks.*

4:54 05:05:2008 *Experiment 4 Inspiration*
The reason for this piece came about because I had planned to visit Michael Adams at his home and studios in the Seychelles. I have found that trying to explain my work is rather difficult, the person has no idea or concept of what it consists of. Photographs only confuse them further. So I knew instantly that if I was to get any advice from Michael Adams then I would have to create a small version to take with me to the Seychelles that would fit in a suitcase - hence smaller size of the piece.

4:55 19:05:2008 *I changed the colours and used a different method of manipulating the inclusions into the voids. The bottom layer consisted of rather large inclusions and forced them down into the voids. I made the bottom layer voids a lot wider than the top voids with just a little background spacing between them. The top layer voids were a lot thinner and caused difficulty in the removal of core and insertion of inclusions.*

4:56 05:03:2013 *There’s something about this piece that I like. Maybe it’s because it’s small, compact, highly detailed, I don’t know. I love the use of the coloured layers within the voids as they blend together beautifully... Hard to explain but when looking at the inclusions they mould into one another... I really like the general feel of the piece and one which I am very happy with. I found the colours to be a great success. The colours are bright and natural looking. The yellows work well with the lime bright greens. Both these colours blend together beautifully and highlight the flecks of orange that are randomly speckled across the piece. The background colour was changed from a stark crisp ice white to a vintage cream coloured mountboard. I think this matched the colours within the voids very well especially the dark brown tones.*

4:57 05:03:2013 *Experiment 4 Matrix Positions*
6 Colour Direction (Void Form and Inclusion Manipulation)
21 Light/Dark Contrast (Void Layering and Inclusion Manipulation)

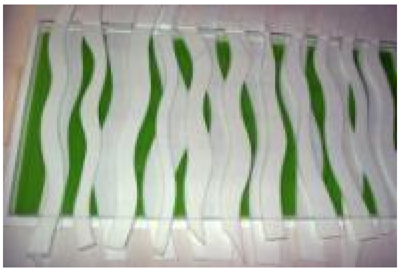
The digital separation shows the strategic placing and colour direction and the detailed images shows the inclusion boundaries

4:58 02:06:2008 *Landed in Seychelles today what a game! My case appeared on the baggage belt with hundreds of white chalk crosses on it. I knew then that customs were going to stop me... and they did. They made me open and unpack the artwork... they even wanted me to undo and remove the inclusions! I told them that it was a piece of artwork to show Michael Adams (Very much the man on the island)... they phoned him and then they came back and let me go.*

4.59 03:06:2008 (Interview with Adams) *Selina what a beautiful piece of work the preciseness and detail is similar to my work. But it has an added quality, a quality of, yes that's it jewellery it is like a large piece of jewellery that catches and reflects the light.*

4:60 16:06:2008 *Experiment 5 Inspiration*
(Interview with Adams) It's a bit like that you know, you look at the landscape you absorb yourself in it, you can become a small ant or a lizard or a passing bird and when they fly through the forest they are very fast. You don't see them you just hear them and you remember the silhouette of them as they disappear. So a forest is marvellous. So on that level you can become anything and you can select a brown leaf which has a light coming through it and that's your stained glass window or you can see a piece of fungus which is filled with Malachite, Lapis lazuli beautiful crumbling colours you know, very suckle very Italian in fact.

4:61 16:06:2008 *Transparent green glass base layer matches the description by Adams of stained glass in rainforest. Upper voids should include no overlap with lower voids. Same colour scheme and manipulation method in lower void as Exp 4. The top void layer should include non-textiles and textiles and a colour scheme consisting of yellow, green, orange and blue.*



4:62 08:03:2013 *The colours are amazing so bright and colourful. The green glass background intensifies the colour inclusions within the voids. The orange draws the eye and the lettering on the fruit labels creates a feeling of intrigue. You have a need of wanting to go up to the piece and search within it without knowing what you are actually searching for. From a distance all the colours and the voids merge into one image, very similar to looking at a rainforest. I can make my own patterns from the colours within the void forms. One of my favourites so far I think, just because of the sheer number of things going on within the artwork.*

4:63 08:03:2013 *Experiment 5 Matrix Positions*
5 Simultaneous Pattern (Void Form and Inclusion Size)
15 Colour Direction (Void Spacing and Inclusion Manipulation)
17 Optical Colour Mixing (Void Spacing and Inclusion Size)

The digital separation of the top void layer shows orange simultaneous patterns and the detail image the effects of the glass transparency.

4:64 29:06:2008 *Experiment 5 Technical Principles*
P11 The inclusion of coloured glass (D5640) which has a different specification to clear glass (D0189) does not affect the firing schedule.
P12 Coloured glass base increases the optical mixing of similar colour schemes in the upper void layer.

4:65 14:07:2008 *Experiment 6 Inspiration*

I want to have another attempt at producing artwork of the Indian Ocean. Exp 1 was not successful. Rather than just represent the Ocean I want to make a statement about big supermarkets that come to tropical islands and spoil them with their plastic carrier bags being littered all over the place and in the sea – thankfully this has yet to happen in the Seychelles. I wish also to explore transparent coloured glass further as I did not fully understand what was going on in Exp 5.

4:66 14:07:2008 *Experiment 6, Sketch of Text Positions*

4:67 10:08:2008 *Nice wave like void forms some of which are forked which I like very much... The stuffing of the plastic bags into the voids is a bit of a pain because they keep on creasing which prevents me from reading the printed text on the bag.*

4:68 13:03:2013 *I love this idea. Just little snippets of text from the plastic bags 'please re-use me' showing through the glass, just how I imagined. More than happy with this one but the beech wood frame is too heavy I think. The plastic bags are a brilliant inclusion they mould to the void forms perfectly, no unsightly gaps or spaces within the glass at all. I chose a transparent blue colour for the background glass. Not much of the background showed through unlike some of the previous experiments however what spacing was left from the voids complemented the inclusions very well. The blue created a bright and refreshing contrast with the white inclusions. A very successful piece, fresh, crisp and clean looking that has an obvious hidden message. Once again there is a wholeness about the artwork*

4:69 13:03:2013 *Experiment 6 Matrix Positions*
4 Colour Harmony (Void Form and Inclusion Type)
6 Colour Direction (Void Form and Inclusion Manipulation)
10 Light/Dark Contrast (Void Spacing and Inclusion Type)
16 Transparency and Colour (Void Spacing and Inclusion Type)

The detailed image shows the colour direction of the text and the digital separation shows the background void spacing.

4:70 14:03:2013 *Review of preliminary experiments to determine colour spread.*

Left shows the effects of placing the green coloured glass at the bottom of the stack. The green transparent glass enhanced the colours of the inclusions within the voids but there was no optical mixing due to colour spread... Middle shows the effects of placing the purple coloured glass in the middle of the stack. The purple transparent glass darkened the bottom layer of inclusions and brightened the inclusions within the top void clearly showing the effects of coloured spread... Right shows the effects of placing a blue glass at the bottom of the stack and a green transparent glass at the top of the stack. The green transparent glass blended into the layers below giving a soft edge to the colour clearly showing the effects of coloured spread.

4:71 27:07:2008 *Experiment 6 Technical Principles*
P13 The inclusion of coloured glass (D4068) which has a different specification to clear glass (D0189) does not affect the firing schedule.
P14 Only small amounts of transparent coloured glass are required to have a significant impact on the aesthetics of the final artwork.
P15 Optical Mixing due to colour spread does not occur when the transparent coloured glass is located base layer.
P16 Optical Mixing due to colour spread does occur when the transparent coloured glass is located in the second or third layer.

4:72 11:08:2008 *Experiment 7 Inspiration*
I like all these dried up leaves hanging from the plants and the parts missing from them around the rainforest. I like the straw like colour of them. I also want to portray patches of colour, similar to that in the rainforest. What I mean here is that in the rainforest not only are there speckled, mottled sections but also masses of coloured areas. Looking down you see a brown carpet of decaying matter but on closer inspection this is full of different browns.

4:73 13:08:2008 *I then cut them into shapes and placed them next to each other and fired them in the kiln using a standard firing schedule. I wanted one void layer as I didn't want to complicate the appearance. I had drawn a decaying leaf that had been scorched in the sun. I decided to use this sketch and translate it into the voided layer. The fibreboard was cut so that it remained in one piece. I placed the fibreboard over the coloured fused layer and a layer of clear glass on top of it and fused it again using firing schedule Appendix 21. The colours consisted of tan browns, oranges and touches of green. The inclusions consisted of paper, plastic and saw dust that was finely cut to ensure that they matted together well.*

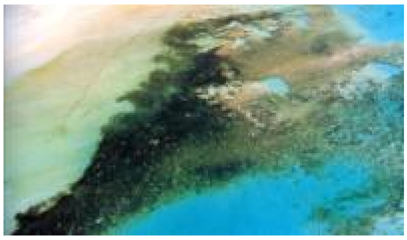
4:74 18:03:2013 *The void layer gives such a good aesthetic effect. However what I did not like was the relationship between the void layer and the coloured glass background. The coloured glass pieces were not the correct colours for the theme. The colours are too bold and do not feel natural at all, unlike the inclusions themselves. Also the blended lines of the coloured shapes are dreadful as they interfere with the natural organic lines of the voided area. The background completely separates from the upper layer to create two distinct planes. I would think that this piece would have looked a lot better if the background colour was a single colour, maybe the same transparent green colour as in experiment five? The success of this piece is the inclusions which represented the burnt faded crispness of the leaf really well, and the use of sawdust added a touch of reality to the artwork and caused the inclusions to optically mix at a distance.*

4:75 20:03:2013 *Experiment 7 Matrix Positions*
10 Light/Dark Contrast (Void Spacing and Inclusion Type)
22 Colour Harmony (Void Layering and Inclusion Type)
26 Optical Colour Mixing (Void Layering and Inclusion Size)

The digital separation shows the distinctive two planes and the detailed image the inclusion types.

4:76 24:08:2008 *Experiment 7 Technical Principles*
P17 The use of straight edged opaque glass pieces should be avoided unless discord is a requirement of the artwork.
P18 The use of a single layer complete voided form enhances the planes within the artwork.

4:77 08:09:2008 *Experiment 8 Inspiration*
You know that you are in the Seychelles when the people gasp at the beauty of the shoreline as plane approaches the island. The sea is full of different colours caused by plant life and corals beneath it.



4:78 09:09:2008 *Diagonal sprinkled crush glass (left below)*

4:79 09:09:2008 *Void strips were placed diagonally to match direction of frit (above right). The void spacing was exaggerated to allow for significant exposure of the background. Clear glass was placed on top and fused and slumped. The expectation for the combination of the inclusion size and the void spacing was that the artwork would create a colourful harmony similar to the view from the aircraft window.*

4:80 21:03:2013 *I am not impressed with the overall look or feel of this piece. Ideally this piece would have worked much better if correct colours were obtainable. It seems you can buy either dark blue, medium blue or light blue but nothing in between. There is no subtleness between the colours. Even when blended together the colours appeared to be quite blotchy. Maybe a fine powder would have worked better? The frit was supposed to act as a background but because of its transparency and blotchiness it added discord to the artwork. I used natural inclusions to represent the beach, however the coral did not manipulate well within the void forms and left spaces which I tried filling with sand. I also noticed an imbalance between the vibrancy of coloured frit and the inclusions within the voids resulting in a further discord. I have to admit these inclusions did nothing for me. This experiment did not work at all.*

4:81 21:03:2013 *Experiment 8 Matrix Positions*
24 Colour Direction (Void Layering and Inclusion Manipulation)

4:82 21:09:2008 *Experiment 8 Technical Principles*
P19 Coloured frit placed on top of clear glass can be combined with a single void layer and fused using firing schedule Appendix 21.
P20 Coloured frit intensity creates a significant imbalance with void inclusion types
P21 Clear glass boarders create difficulty if the artwork is to be framed

4:83 01:10:2008 *Experiment 9 Inspiration*
My inspiration is from the bamboo at the Jardin Du Roi high up on top of the island. I noticed a plant growing out of the bamboo... it was a lovely saturated green... I took a photograph of it.

4:84 01:10:2008 *Experiment 9, Initial Composition*

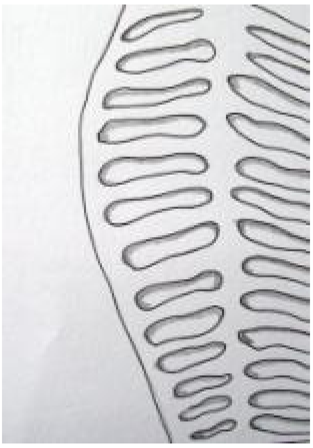
4:85 01:10:2008 *The glass canvas consisted of three layers of glass with large figurative cuts of refractory board being placed between layers one and two and layers two and three.*

4:86 11:10:2008 *Blimey, the top layer is so thin if I try and stuff this it will just break... The lower voids have not closed off... It is as though the piece has hardly been fired... I just can't use this...*

4:87 11:10:2008 *Experiment 9 Technical Principles*
P22 The thermal insulation of large areas of fibreboard absorbed the heat from the top elements of the kiln and causes the top layer of glass to overheat and become more viscose. This increased viscosity causes the glass to flow away due to gravity resulting in a very thin top layer of glass.
P23 The thermal insulation of large areas of fibreboard prevents the heat from getting to the lower layers of glass preventing the voids to close off properly.

4:88 13:10:2008 *Experiment 10 Inspiration*
I recall that I was sat on a rock thinking about painting the sea when I noticed a palm leaf hanging down from a coconut tree. I was fascinated by how the light came through the gaps left between leaves and how other leaves overlapped it. The colours were a mixture of greens and yellows on the leaves and the midrib was mainly green.

4:89 13:10:2008 *Lower void layer... I need to alter the shape slightly to gain access for the removal of the fibreboard and the stuffing of the inclusions. The edges of the leaves need to be joined otherwise the inclusion will jam in the point of the leaf.*



4:90 14:10:2008 *Upper void layer... Need to do the same but I will leave three undone just to see how difficult it is... Oh that is interesting the void in the top of the sketch will overlap the lower void as expected. However, the void in the bottom of the sketch will not overlap anything but will have double the thickness of glass beneath it. Wonder what will happen there?*

4:91 14:10:2008 *Initial composition of lower and upper void forms and general colour scheme and prepared it in the normal way.*

4:92 29:10:2008 *I created two layers of three coconut palms. The bottom layer coconut palm was cut as one single piece and was placed so that it covered 50% of the background. The top layer coconut palms were placed on the opposite side to balance the composition with the coconut palm towards the top left of the artwork slightly overlapping the bottom layer shape on the right. I found that removing the fibreboard from the glass, after firing, was extremely difficult. The voids were so narrow that the fibreboard would jam quite easily.*

4:93 07:11:2008 *I used very fine chopped recycled silk fibres as my main inclusions but this did not stop the inclusions from jamming in the voids. Greens were placed on the edges of the leaf shapes and down the midrib of the leaf and yellow were placed between them. I added hints of blue to one of the top leaf shapes to break up the montage of greens and yellows. I also did the same with orange between the yellows. I used a tight weave hessian textile for the background layer. The idea behind this was to try and represent the hairy brown fibrous texture of the coconut husk.*

4:94 26:03:2013 *Quite an exciting piece... The final appearance is very attractive. The hessian background works very well... the glass magnifies the weave. The colour of the hessian contrasted well with the inclusion colours. The blending of silk fibres is excellent, they give the artwork a painterly quality. The colours seem to give the artwork a warm feeling. There is something wrong with these inner void edges they look awfully rough... Overall very pleasing to look at.*

4.95 29:10:2008 *Experiment 10 Technical Principles*
P24 The angle of the knife blade must always be perpendicular to the fibreboard when cutting otherwise poor internal void edges will result.

4:96 26:03:2013 *Digital separation showing blending of the silk fibres*

4:97 26:03:2013 *Experiment 10 Matrix Positions*
1 Light/Dark Contrast (Void Form and Inclusion Type)
4 Colour Harmony (Void Form and Inclusion Type)
8 Optical Mixing (Void Form and Inclusion Size)
19 Cold/Warm Contrast (Void Layering and Inclusion Type)
24 Colour Direction (Void Layering and Inclusion Manipulation)

4:98 17:11:2008 *Experiment 11 Inspiration*
The definition of the leaves is so precise resulting in clear boundaries. I like the way the midrib draws the eye. I think I will do a painting it's so nice and peaceful here... palm leaves and rainforest that's a good mix... I like my painting I can easily translate this into a working design. The lower layer will represent the rainforest and upper the palm leaf. I will keep the hessian textile as the main background colour because it worked so well in the last experiment. In the bottom layer I need a few long thick voids to represent the tree trunks. I need this layer to be seen as completely different from the top layer so the inclusions I will use will be based on orange... Mainly papers and fibres... In the upper layer I need a very thin palm leaf void. I know this will cause problems when inserting the inclusions but if I achieve it then it would be worthwhile. Three days it has taken me to remove the fibreboard.

4:99 01:04:2013 *This is a very complex piece of void fusing and slumping. Interestingly I can see the clear distinction between the top and bottom layer planes... The colours within the voids on the bottom layer are darker than those of the upper void layer resulting in a high degree of colour contrast... It's like having two distinct images within one piece of artwork. The leaf and tree like void shapes combined with the natural colours give a high degree of realism to the artwork... The hessian background adds to this... My first thoughts are that the void shapes and colours cause too much of a separation but on reflection this is how it actually looks in the rainforest... The more I look at it the more I feel like I am in the rainforest... There is something about this piece that makes it unique maybe it is the opposing directions of the voids, my eyes get draw into it, or maybe the shadiness like some parts of the rainforest*

4:100 01:04:2013 Digital Separation shows the three distinct layers

4:101 01:04:2013 *Experiment 11 Matrix Positions*
Detail showing sense of depth

1 Light/Dark Contrast (Void Form and Inclusion Type)
19 Light/Dark Contrast (Void Layering and Inclusion Type)
24 Colour Direction (Void Layering and Inclusion Manipulation)

4.102 03:12:2008 *Experiment 11 Technical Principles*
P25 The non-void area must be of sufficient size to allow it to fully slump down to the lower void layers.

4:103 22:12:2008 *Experiment 12 Inspiration*
I recall that I was sitting on the grass in the garden and looking at a fresh banana plant standing tall and proud in front of a mass of dried up palm trees. The colours stood out so well against the contrast of the dull brown colours... I imagined a figurative piece with fine detail within the voids. The inclusions in the lower void would be browns, purples, blues and sparking gold to reflect the effect of sunlight on the trunk. In the upper void layer the leaves of the banana plant void highlighted the brightness of the yellow of the decaying leaves. When I returned home I translated my photographs, sketches and painting into a two layer artwork. I used finely chopped pre-dyed recycled natural and synthetic textiles, paper, bottle top, metallic foils and threads as inclusions.



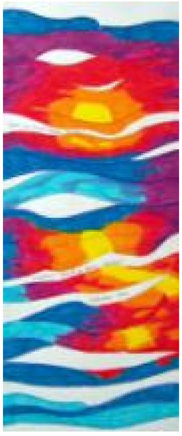
4:104 08:04:2013 *This is an absolutely stunning piece. The vibrancy of the inclusions I had placed in the banana plant voids contrasted beautifully with the brown mixture of the tree voids behind. I love the incorporation of the blues, purples and green inclusions mixed in with the browns, and the way I have layered the one colour over another to produce a natural looking pattern within the tree. For me, the highlight in this piece has to be the gold metallic threads I have used amongst the other inclusions, they bring the piece to life with their reflected sparkle... this piece stands out from the other experiments. I also like the shadows at the edges of the void forms and how the artwork reflects the light in general. The colours look much brighter than they really are. I love the Seybrew bottle top in the work it gives me a sense of nostalgia about just being there... I forgot how powerful the colour white can be, using it as the background represents the crispness of light... this crispness reminds me of the Caribbean rather than the Seychelles.*

4:105 08:04:2013 *Experiment 12 Matrix Positions*
1 Contrast of Hue (Void Form and Inclusion Type)
1 Saturation Contrast (Void Form and Inclusion Type)
7 Transparency and Colour (Void Form and Inclusion Type)
7 Reflection and Colour (Void Form and Inclusion Type)
19 Light/Dark Contrast (Void Layering and Inclusion Type)
24 Colour Direction (Void Layering and Inclusion Manipulation)

4.106 04:01:2009 *Experiment 12 Technical Principles*
P26 Larger void areas up to a maximum of 75 cm² could be produced successfully using the firing schedule Appendix 21.
P27 Any inclusion type such could be inserted into the glass voids provided it did not exceed 4 mm in depth and fitted within the void width.

5:1 05:01:2009 *Crispness of light and vibrant colour, yes that has got to be the Caribbean, but which island?... Barbados, short flight no interchanges, I know the island quite well... Last time I stayed at the Cobblers Cove Hotel in St. Peter district... I remember a man in a straw hat sitting in the grounds close to the pool painting a watercolour of the sea and overhanging palms... I just knew then one day that I would return and it would be me sitting there... The blue sea, the amazing sunsets, the brightly coloured chattels, the fun atmosphere... absolutely perfect.*

5:2 09:02:2009 *Experiment 13 Inspiration*
I recall the second night on the island and the beautiful sunset, just sitting there capturing the forms of the patches of colours.



5:3 09:02:2009 *I want the dominant feature of this artwork to be the image within the inclusions rather than glass void forms. I will use three layers of glass with two voided layers with a combination of narrow and wide sections spaced unevenly across the top and bottom layers of the piece. I want the upper void layers to eclipse the lower ones but I don't want them to twist. My memory of the sunset is one of a kind of flatness, it's like watching a panoramic view in the cinema but on a much larger scale... there is an evenness of colour and no harsh reflections... pure tranquillity. I want only a slight exposure to the background so I have maximum void area to add and manipulate the inclusions.*

5:4 1:02:2009 *I need to be careful here about the firing schedule because there is a lot of fibreboard in this piece. I wonder if I applied more heat to the top surface maybe the whole glass would sink leaving a flatter top surface. I think I will use the firing schedule from experiment 3 amend the hold time in segment 2 to 40 minutes this may flatten the top layer a bit.*

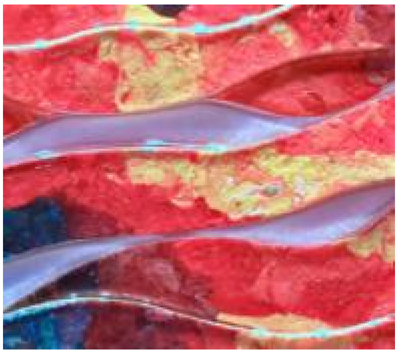
5:5 16:02:2009 *Today I started to remove the core material 7 solid hours and I've done about a quarter... Five days it took me to get the core material out... I need another two to grind the edges.*

5:6 02:03:2009 *This is going to be difficult how do I get the inclusions in the right place... need to think about this? What if I get a felt tip pen and mark the positions onto the glass... That worked well.*

5:7 03:03:2009 *I need to hand dye some silk fibres and yarns using acid dye. I want them to be as vivid as possible... I saw a program on silk scarves where they steamed them in a steamer to bring out the colour... Well I think I can make a steamer out of a piece of pipe and an old car break disk... For the steam I will use a wallpaper stripper, disconnect the stripper plate and feed the tube into the bottom of the pipe... I will then wrap the dyed fibres around a cardboard tube and suspend it in a pipe. I will let it steam for two hours... Absolutely brilliant the colours are so vivid.*

5.8 17:03:2009 *Brought a new gun today to fix outer frame to inner frame... much more professional looking and so easy to do. It no longer matters about the thickness of the inner assembly and the padding of clips as in the first set of experiments.*

5:9 21:03:2009 *This is a heavy piece... I need to go to Lions and see what they have for hanging heavy paintings... These heavy duty hangers are really good I can adjust the hangers to level the artwork... that's useful.*



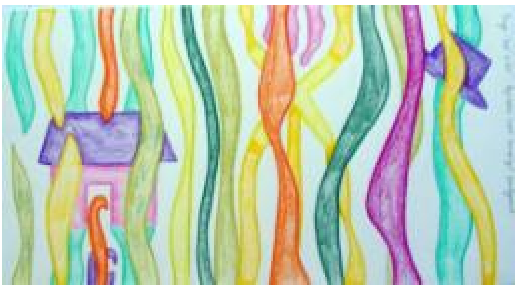
5:10 12:04:2013 *This sunset is absolutely stunning… reminds me of sitting by the beach bar painting and capturing the sun as it is just going down. I love the vibrancy of the colours... made even more so by the transparency of the glass… definitely makes me feel warm. The blue contrasts well with the red and yellow… I like how the inclusions blend seamlessly into one another and manipulate themselves within the voided form. I think the lights make the piece look soft with the textile inclusions. I like the void forms that cause the eyes to drift around the artwork before settling in the centre... I like how it is less simplistic than the earlier experiments... it reminds me more of a painting... The white void spaces increase the brightness of the colours.*

5:11 12:04:2013 *Experiment 13 Matrix Positions*
1 Saturation Contrast (Void Form and Inclusion Type)
7 Transparency and Colour (Void Form and Inclusion Type)
4 Colour Harmony (Void Form and Inclusion Type)
19 Contrast of Hue (Void Layering and Inclusion Type)
19 Cold/Warm Contrast (Void Layering and Inclusion Type)
8 Optical Colour Mixing (Void Form and Inclusion Size)
6 Colour Direction (Void Form and Inclusion Manipulation)
19 Light/Dark Contrast (Void Layering and Inclusion Type)

5:12 09:02:2009 *Experiment 13 Previously Identified Technical Principles Used: Principles 2;3;5;7;8;10;22;23;24;25*

5:13 23:02:2009 *Experiment 13 New Principles Identified*
P28 Amending the hold time in segment 2 to 40 minutes will flatten the top surface layer of the glass.
P29 The firing schedule detailed in Appendix 27 is satisfactory for a glass size with a surface area of 2128cm².

5:14 23:03:2009 *Experiment 14 Inspiration*
Today I went to St Peter's District to see the brightly coloured wooden chattels and beautifully planted gardens. I really feel good about visiting this place, for me this is what Barbados is all about. I think I will make a few coloured sketches. I want this to be maximum size. I guess the maximum size and the most economical cut of the glass, is a size of 75cm x 50cm landscape which is a full sheet quartered. Any bigger than this and I would not be able to handle it because of the weight.



5:15 24:03:2009 *I want the voids to be across the 50cm dimension making the removal of the void material less difficult than the 75cm horizontal. I want it to be a happy piece of artwork that captures the bright colours and fun of Barbados. I will use three layers of glass with two void layers. I want the voids to overlap in certain areas to create an illusion of looking through flora and fauna towards the chattel in the background. I want to create these figurative elements by shapes within the void layers rather than on the underside of the glass as in experiment 2. I will need to amend the firing schedule which will be based on experiment 13 with the hold time in segment 2 decreased from 40 to 30 minutes to increase the three dimensional effect of the top surface.*

5:16 29:04:2009 *The firing schedule is complete, programmer reads 40°C quite excited really I will now open the kiln... the glass looks normal. I will close the kiln and leave the work until I need it. Today (06:04:2009) I opened the kiln again... Oh no the glass is cracked right across the top right quadrant through all three layers. So upsetting what a waste of time, effort and money... I thought things were going so well. What on earth has happened... It was fine a few days ago... but now it has cracked.*

5:17 06:04:2009 *It must be the annealing on the downside of the firing curve... if it had been thermal shock it would have happened on the upside of the firing curve and would have been cracked when I first opened the kiln. The glass was well fused but I can see possible stress areas.*

5:18 07:04:2009 *Experiment 14, Composition 2*

I cut out figurative shapes of the shacks, leaves and trees and prepared the glass by placing it in the kiln. It consisted of three layers of glass with two void layers and measured 50cm x 75cm in landscape format. I overlapped the voids in certain areas to create an illusion of looking through the flora. I created a balance between voided and non-voided areas. The voids in the top layer were evenly distributed across the whole composition. The glass was placed in the kiln and heated using a different firing schedule which significantly extended the annealing period by increasing the hold times in segment 3 from 10 to 60 minutes and segment 4 from 60 to 480 minutes (Appendix 29)

5:19 21:04:2009 *Today I started the core removal it is difficult - I have to keep altering my position rather than moving the glass because it is too heavy... this is a more delicate process and the length of the voids means I have to be extremely careful not to break the glass with the removal canes... 8 hours and I hardly got any of it out... 16 days it has taken me to get this out. I am glad that it is over (06:05:2009).*

5:20 13:05:2009 *Stressometer arrived today looks like a torch... by holding it at the back of the glass and a polarised filter at the front I should be able to identify the stress in the glass... Yes this works really well... The glass is perfect I guess that will remain the firing schedule for all large sized pieces...*

5:21 18:05:2009 *I am going to explore the use of scale and proportions in this piece. Inclusions - the brighter the better I am going to vary the inclusion size from large to small in this piece and use hand dyed silk fibres, recycled plastic shopping carrier bags, papers, raffle ticket stubs, fruit netting, cotton, threads, yarns, synthetic fabrics. I will manipulate the inclusions layer upon layer as to represent the wooden slats of the chattel walls. For the trees and leaves I want a mottled effect to reflect their patches therefore the inclusion size needs to be larger. I want to try something different in this piece... Instead of creating separate voids to hold certain colours I am going to define the walls and roof of the chattels using colour within the void forms. I think I will add a found object like a Barbados stamp to give the artwork a sense of realism and to break up the large area of chattel void.*

5.22 17:04:2013 *There is something about this piece that distinctly reminds me of the St. Peter district. Maybe it is the bright glistening colours and the crispness of the white background... or the mixture of different inclusion sizes and colour that create a fragmented effect... or the flora contrasting with the more solid colour of the chattels... Maybe it is the figurative voids against the organic voids which seem to oppose one another... a kind of man-made verses nature. My eyes get drawn from the edges to the middle part then I begin to recognise two distinct layers... Overall a generally fun loving, bright crisp experiment jammed packed with the Caribbean spirit that makes me quite cheerful.*

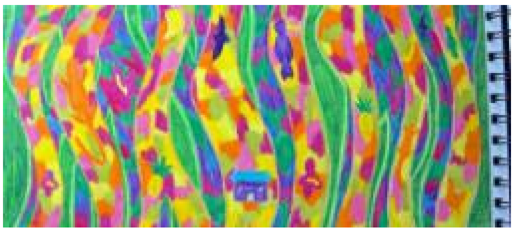
5:23 17:04:2013 *Experiment 14 Matrix Positions*
19 Saturation Contrast (Void Layering and Inclusion Type)
19 Cold/Warm Contrast (Void Layering and Inclusion Type)
7 Transparency and Colour (Void Form and Inclusion Type)
16 Transparency and Colour (Void Spacing and Inclusion Type)
2 Light/Dark Contrast (Void Form and Inclusion Size)
6 Colour Direction (Void Form and Inclusion Manipulation)

The yellows and pink summery colours in the lower layer are shown in the detailed image

5:24 07:04:2009 *Experiment 14 Previously Identified Technical Principles Used*
Principles 2;3;5;7;8;10;22;23;24;25;26

5:25 22:03:2009 *Experiment 14 New Technical Principles*
P30 Larger void areas can be placed in the lower void layer ensuring that two layers of glass thickness are fused over the void form
P31 For large sized glass stage 3 of the firing schedule (unregulated annealing) needs to be reduced from 546º C to 510º C to ensure heat loss.
P32 For large sized glass stage 4 of the firing schedule (stress annealing) hold time needs to be extended from 60 to 480 minutes to ensure heat loss.
P33 All glass when fired should be checked for stress points with a stressometer for safety reasons.

5:26 29:05:2009 *Experiment 15 Inspiration*



I visited Andromedia Gardens and sketched lots of different plant life, animals and general scenery. I thought this was the perfect opportunity to combine all my sketches together and form an experiment based on the visit. I wanted to try something different with this experiment. All my previous experiments used either the void shapes or inclusions and colour to depict the narrative. I had lots of different sketches of animals, fruit and chattels. I thought of the idea of actually painting them first onto canvas then inserting these into the voids. The size of the artwork would be 1 metre in width (actual size 25cm x 100cm) this being the optimum size if the full width of the glass sheet was used.

5:27 22:06:2009 *I want the composition to consist of three layers of glass the base being transparent dark green coloured glass. There will be two layers of wide voids evenly distributed across the piece. I will use the same firing schedule (Appendix 29) as I did for experiment 14 without amendment... Not bad 5 days to remove the core material... because of the 25 cm depth.*

5:28 15:07:2009 *If I am going to paint chickens, pineapples, bats, chattels, coconuts, leaves, lizards, bananas and hibiscus flowers onto scrap pieces of canvas I need to get their sizing right otherwise they will not fit within the void forms... I will first make paper cut outs and place them onto upper void layers to get the size and positioning correct... That worked quite well... I really enjoyed painting the icons on the scrap pieces of canvas... Oh no the canvas is buckling and creasing as I insert it... I have stuck a piece of foam board to the back of the canvas... This works really great the icons are pushed up to the inner surface of the glass. I am going to use fun Caribbean colours... In the bottom layer I will use dark blues, pinks and greens and in the top layer a different contrast of light pinks, oranges, yellows and greens... I want the dark green coloured glass to represent the dominant colour in the Andromeda Gardens with the brightly coloured flowers and creatures surrounded by a backdrop of lighter green leaves. I will use a medium inclusion size of curtain fabric, cotton, paper, wool, yarns, hand dyed silk fibres, foil and organza. I will also add a Barbados stamp to add a touch of realism.*

5:29 26:04:2013 *The bright colours and icons make this a very cheerful piece. The background green glass is much darker than I imagined giving the whole piece impact. The top coloured inclusions contrast so well with the dark green glass... they seem to be a lot brighter than when they were outside the glass. There's a distinct glossiness to the glass. The stamp blends nicely with the other inclusions. The shapes are simple which tend to make me look at the inclusions more. The wider void forms result in much more colour. The bottom layer inclusions are significantly darker in colour than the top, with a refined colour palette of blues, pinks and greens which result in an illusion of depth. The top layer consists of a more vibrant colour palette with the main colours being oranges, yellows and pinks capturing the spirit of fun and happiness of the Caribbean. The dark green coloured glass background seems to enhance the colour between the foreground and background. Overall another successful artwork that reminds me of the colours and fun of the Caribbean.*

5:30 26:04:2013 *Experiment 15 Matrix Positions*
12 Light/Dark Contrast (Void Spacing and Inclusion Manipulation)
7 Transparency and Colour (Void Form and Inclusion Type)
16 Reflection and Colour (Void Spacing and Inclusion Type)
6 Colour Direction (Void Form and Inclusion Manipulation)

5:31 01:06:2009 *Experiment 15 Previously Identified Technical Principles Used: Principles 2;3;5;7;8;10;12;14;15;22;23;24;25;26;27;30;31;32;33*

5:32 22:06:2009 *Experiment 15 New Technical Principles*
P34 The inclusion of coloured glass (D5332) which has a different specification to clear glass (D0189) does not affect the firing schedule.

5:33 10:08:2009 *Experiment 16 Inspiration*
A bit overcast today but the colours of the Caribbean Sea are so intense this is going to be the defining piece in my research... I want this piece to flow freely across a big glass with a multitude of voids containing a whole host of blues. I want to capture the horizon as well to represent the awe that I feel at this particular moment. I will go landscape with the glass to show the expanse of water. The void shapes would be all wave like apart from the void placed at the top which will be straight to represent the horizon. I want the voids to twist so that the light bounces off the artwork adding to the movement.

5:34 12:08:2009 *I cut smooth wavy strips of fibreboard today... I cannot keep exactly to my composition because once I start cutting it has to be done in one movement or else I will get rough internal edges on the voids similar to what happened in experiment 10... it's odd how things from*

previous experiments keep coming back. I like the variation in void widths that I have cut... some are too thick I need to cut them down... nice set of void strips I need to place them now... In the lower layer I have placed all void strips so that they run horizontally across the artwork. In the top layer I have done the same but made sure that I have created overlaps that are going to twist like in experiment 3. I have created a clear horizon line at the top of the artwork... Final checks complete... Firing schedule same as experiment 15 with no amendments... Set kiln programme... come back in two days... The lights are flashing in the house therefore the kiln must be working... Opened the kiln today looks like a satisfactory piece of glass... I will leave it for a few days just in case... No problems I will start removing the core material today (25:08:2009)... Wow this is difficult the small thin voids are difficult to access... It is difficult to get to the core material in the centre of the work because the bamboo stick keeps jamming... I'm glad that is over, it has taken me over a month to remove the core material... No problems with the stress check... The relationship between the being and non-being is clear to see at this stage.

5.35 28:08:2009 *I am going to use medium chopped sized inclusions in the voids consisting of cotton wool, ribbon, angel hair, silk organza, lamé, silk, satin and lace... Today I have dyed lots of inclusions with different shades of blue... I like the way the silks have taken up the dye differently giving me a wide range of colour values... better place them in airtight jars... Well I have to start somewhere... I will put the very deep blue inclusions at the top of the voids where the horizon is and work my way down in graduations of colour until I get to the bottom voids where I want whites to depict the surf breaking on the beach.*

5.36 01:05:2013 *This is staggering, I love this piece. The angles of the voids cause the light to sparkle across the piece, just like the actual sea. I feel like the sea is glistening as if water is flowing over the top of the inclusions... there is a surreal effect similar to that when looking out over a sunlit shimmering sea caused by the low*

voltage light emitting diodes... I see fluidity and rhythm not only in the organic void forms but also as the light moves along the top edges of the voids. I like all the different shades of blue... They are clearly much more vivid that when I put them in... This change is far more noticeable than in previous experiments. I like the way the colours blend with each other whilst in the voids and across the void layers... the voids and the colours seem to complement one another. I *like the way the top layer void forms overlap the majority of the bottom shapes resulting in a feeling of intrigue of what's in the lower voids... I like the breadth of this piece as it gives the impression of the vastness of the sea... There is also very little exposure of the white background which I like because it emphasises the technique and inclusions more. I am so happy with the final result and so proud I have managed to produce it... Everything has come together at once... The best piece by far!*

5:37 01:05:2013 *Experiment 16 Matrix Positions*
7 Transparency and Colour (Void Form and Inclusion Type)
16 Transparency and Colour (Void Spacing and Inclusion Type)
25 Transparency and Colour (Void Layering and Inclusion Type)
9 Reflection and Colour (Void Form and Inclusion Manipulation)
18 Reflection and Colour (Void Spacing and Inclusion Manipulation)
27 Reflection and Colour (Void Layering and Inclusion Manipulation)
8 Optical Colour Mixing (Void Form and Inclusion Size)
6 Colour Direction (Void Form and Inclusion Manipulation)
15 Colour Direction (Void Spacing and Inclusion Manipulation)
24 Colour Direction (Void Layering and Inclusion Manipulation)
5 Simultaneous Pattern (Void Form and Inclusion Size)
4 Colour Harmony (Void Form and Inclusion Type)
13 Colour Harmony (Void Spacing and Inclusion Type)
22 Colour Harmony (Void Layering and Inclusion Type)
1 Saturation Contrast (Void Form and Inclusion Type)
1 Light/Dark Contrast (Void Form and Inclusion Type)

5:38 12:08:2009 *Experiment 16 Previously Identified Technical Principles Used*
Principles 2;3;5;7;8;9;10;22;23;24;25;31;32;33

5:39 27:09:2009 *Experiment 16 New Technical Principles*
There is an optical explanation for this increase in brilliance. Without the overlay, incident light can only reflect off the coloured glass based upon the law of reflection where the reflected angle is the same as the incident angle. When a transparent layer is placed on top, there are many more possible light paths depending on the distribution of light from the illumination source and the shape and roughness of the tesserae. This will enhance the amount of light reflected in a particular direction and change the appearance. If the sides of the tesserae are rough rather than smooth, a wider distribution of reflected angles will result. Any roughness at the interface between the transparent and coloured glass will also increase the distribution of angles. It is this distribution of angles that produces the brilliance when compared with the coloured glass alone. Regularly shaped pieces such as those made by machine will have a more limited number of possible light paths and therefore reduced brilliance.

P35 When a transparent layer of glass is placed on top it adds more possible light paths to the inclusions depending on the distribution of light from the illumination source and the void shape. This will enhance the amount of light reflected in a particular direction and change the appearance.

5:40 02:11:2009 *Experiment 17 Inspiration*

My last day on the island... Going for a walk along the beach... I open the door to my apartment and I feel the warmth of the early morning sun... Everywhere looks so bright and crisp... I walk along a footpath that leads to a barrier of palms trees which separates me from the beach and sea... I walk through this narrow band of trees and onto the beach... As I walk along the beach I notice how the sea ebbs and flows very gently onto the beach... I sat down on the warm sand and looked back from where I had walked and made a watercolour pencil sketch... My last walk...

5:41 03:11:2009 *I want the voids to give the figuration rather than the inclusions... I will use three layers of glass and two void layers... I will place the upper layer voids over the bottom layer voids to create the narrative scene... Inclusions... Colours will be based around yellows, browns, blues and greens... I will use finely chopped silk, satin, cotton, lace, wool, threads, glitter, angel hair, silk organza, straw, sawdust, foil, hand dyed silk fibres, sawdust and some banana plant fibres I brought back from Barbados.*

5:42 10:05:2013 *The first thing I notice is the palm tree moving towards the sea... I always remember being told palm trees will always sway towards the sea... I like the colours because they seem natural and give a sense of realism to the artwork... I like how the sea voids and horizontal colour graduations direct my eyes into the centre of the artwork. I like the contrast between the darker browns and lighter browns in the lower and upper tree voids... it is drawing me in, just like when I was walking towards them in Barbados... The palm trees glitter and sparkle as the light reflects off them... I really like the splashes of orange in the upper layers of the palm trees they seem to add a different dimension they stand out and catch my eye... It's surprising how the small flecks of red in the vivid green leaves keep grabbing my attention... I love the texture in the beach section caused by the banana fibres... it gives the artwork a real tropical feel... Really nice and tranquil.*

5:43 10:05:2013 *Experiment 17 Matrix Positions*
4 Colour Harmony (Void Form and Inclusion Type)
6 Colour Direction (Void Form and Inclusion Manipulation)
19 Light/Dark Contrast (Void Layering and Inclusion Type)
7 Reflection and Colour (Void Form and Inclusion Type)
2 Contrast of Extension (Void Form and Inclusion Size)

5:44 03:11:2009 *Experiment 17 Previously Identified Technical Principles Used*
Principles 2;3;5;7;8;10;12;14;15;22;23;24;25;26;27;30;31;32;33;35

5:45 20:11:2009 *New Technical Principles*
P36 Figuration can be provided directly by the void formation.

5.46 07:12:2009 *Experiment 18 Inspiration*
Sitting here by the pool sketching a heliconia plant bright and colourful... some beautiful vibrant purple flowers... I feel so good.

5.47 08:12:2009 *I sketched out my composition onto the fibreboard so that both top layer voids and bottom layer voids were technically on one layer. I then cut this up and placed the background shapes (which were the bottom layer) onto the bottom layer glass and the flower image on the top layer glass. I then trimmed a quarter of an inch all around the background bottom layer shapes so that the glass had something to fuse to between the voids. Once fused, the background voids were extremely easy to remove as they were relatively large with the top voids proving more difficult.*

5.48 25:05:2013 *This is very different, the piece still looks three-dimensional despite having no overlapping of voids... It's like a flat piece of glass with ridges in it rather than the three-dimensional forms of the previous experiments... The edges are absolutely perfect they are so even... When looking at it from a distance I am not too keen on the space in the centre of the piece... I had no choice but to leave it out because I would not be able to reach it and remove the fibreboard... By inserting the same dark coloured inclusions in all background layers the bright flowers in the upper layers stand out more... I like the greens in the*

leaves really zingy to use Claire's expression... I like the mottled appearance with the lighter coloured and metallic threads and yarns entwined with darker fabrics on the bottom layer... The magenta of the flower contaminates the white background space... In all I think a very successful piece in terms of the structure of the void forms that would enable it to be butt jointed with a similar piece.

5:49 25:05:2013 *Experiment 18 Matrix Positions*
19 Cold/Warm Contrast (Void Layering and Inclusion Type)
7 Reflection and Colour (Void Form and Inclusion Type)
25 Transparency and Colour (Void Layering and Inclusion Type)
6 Colour and Line (Void Form and Inclusion Manipulation)
17 Optical Colour Mixing (Void Spacing and Inclusion Size)

The image shows the relationship between the digital separation base layer and angles in relation to colour and digital separation of the upper layer.

5:50 08:12:2009 *Experiment 18 Previously Identified Technical Principles Used Principles 2;3;5;7;8;22;23;24;25;26;27;30;31;32;33;35;36*

5:51 19:12:2009 *Experiment 18 New Technical Principles*
P37 The placement of fibreboard so that the upper layer does not overlap with the lower layer results in a relatively flat piece of glass with perfect edges for butt jointing.

5:52 10:01:2010 *I feel like a fish being hooked and dragged to somewhere I don't want to go. The perfect edges lead me to think in terms of wall tiles, repetition, production and all those things I associate with non-art. I don't want to let go of them being just beautiful artworks*

5:53 31:01:2009 *This trip has been good for me... I like going to a place that inspires me - just sitting there absorbing the atmosphere making sketches and paintings, their translation to initial compositions simply flowed... It's really difficult to explain. I get a vibe about a place that inspires me so deeply like St Ives and Seychelles and it brings out the best in me... I mean as opposed to being told that I have to make a composition from something like filigree... It felt different this time returning to the island. I was going to work not to play... I had a sense of pride, for the first time it felt like I was working as a professional artist... I very much enjoyed that.*

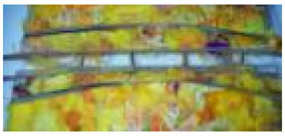
6:1 01:05:2013 *Experiment 19*

Well the voids on the top are very thin... the bottom layer looks like it has not fused at all... Good grief the stressometer shows multiple stress points... I am going to have a go at stuffing this piece and see what happens... I will have to do this blind because I need to place a tea towel over it to stop the glass from flying should it break... So far so good about half of the stuffing has gone in... I can hear little pings but I cannot see any cracks... I can feel the pressure now it's getting harder to insert... it's gone... all the insertions have sprung out... they are all fluffed up they look so soft... the glass is toast I will never be able to work with that... will cut my hands to ribbons.

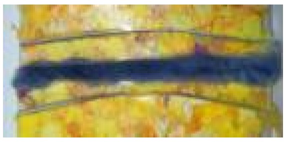
6:2 03:05:2013 *I like the softness of the exposed fragments they bring another aesthetic quality to my work... That softness is inherent in a lot of the experiments but I don't see it as such because the fibres are compressed inside the void forms... If I want the inclusions to show through I will need to create stress free openings in the upper voids and find a way to stop the inclusions from falling out... Need to give this some thought.*

6:3 09:05:2013 *Today I got my Makita glass saw very nice bit of kit it comes with its own charger and a nice bag... This is easy enough to do, far better than the grinder... Wow just look at those edges there are absolutely perfect. This means I can salvage pieces of glass... I should have had this at the start of the research not the end... Now for the tricky bit... I need to cut twice along this void... That was easy enough.*

6:4 11:05:2013 *Bamboo Dam*



6:5 11:05:2013 *The first thing I see is the softness of the exposed silk fibres... they appear softer than the ones inside the void forms... but they are not really... this aesthetic quality of softness requires more research... The technique is intriguing because it reminds me of the trapunto slitting process... instead of the slit being underneath it is on top and not closed off.*



6:6 27:05:2013 *Experiment 8 The coral, sand and plastic netting are recognisable from quite a distance. The sand does not act as a blending agent resulting in clear boundaries around the coral. The association of coral with hardness is greater than that of sand and softness.*

6:7 27:05:2013 *Experiment 2 The metallic leaf used in the base layer void is recognisable and clearly defines the boundary of the void form and fails to mix optically at a distance resulting in an association with hardness. The suggestion of leaf softness is also absent.*

6:8 27:05:2013 *Experiment 5 The first, third and fifth void forms have relatively large sized textile inclusions so that there is a natural association with softness. However, the colour and manipulation defines clear boundaries which create a sense of hardness.*

6:9 27:05:2013 *Experiment 14 The inclusion size, contrasting green and orange colours give a pattern and texture suggesting a dominant coldness and hardness despite the summery pinks in the lower void layer which suggest warmth and softness.*

6:10 27:05:2013 *Experiment 10 The inclusion manipulation in the upper layer results in an appearance which has less hardness. However, the variety of inclusion types and contrasting colours still present fairly well defined boundaries. The figurative void forms enhance the appearance of hardness.*

6:11 27:05:2013 *Experiment 15 Despite the variety of inclusion colours and the icons within the upper voids there is a beginning of softness. The filmy appearance of the pastel colour harmonies manipulate into softer edges. The void width enhances this effect.*

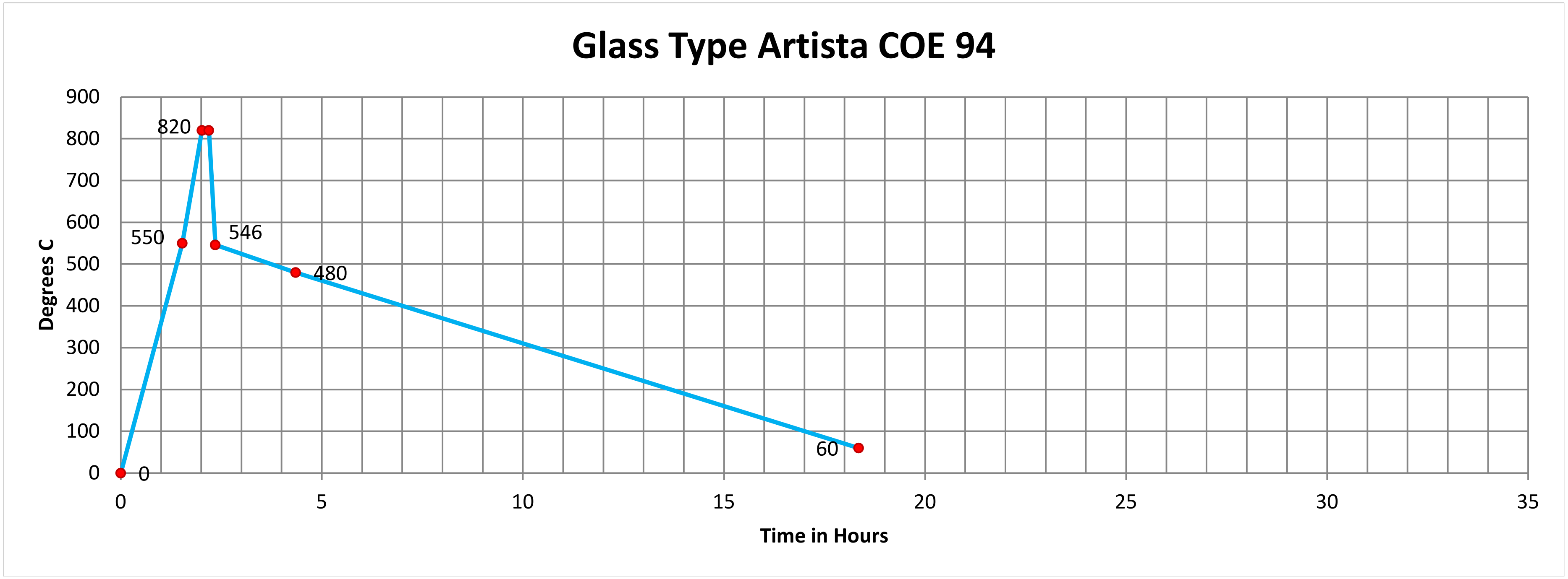
6:12 27:05:2013 *Experiment 16 The silk fibre inclusion type and the analogous colour scheme reduce the boundary definition giving a visual appearance of softness. The rhythmic flow of the void form edges and the reflection of the illumination reduce the appearance of softness.*

6:13 27:05:2013 *Experiment 17 The silk fibre inclusion type and felting technique of manipulation result in optical mixing at a very close range causing a diffusion of boundaries. The appearance of softness is enhanced by the association with the material properties of softness.*

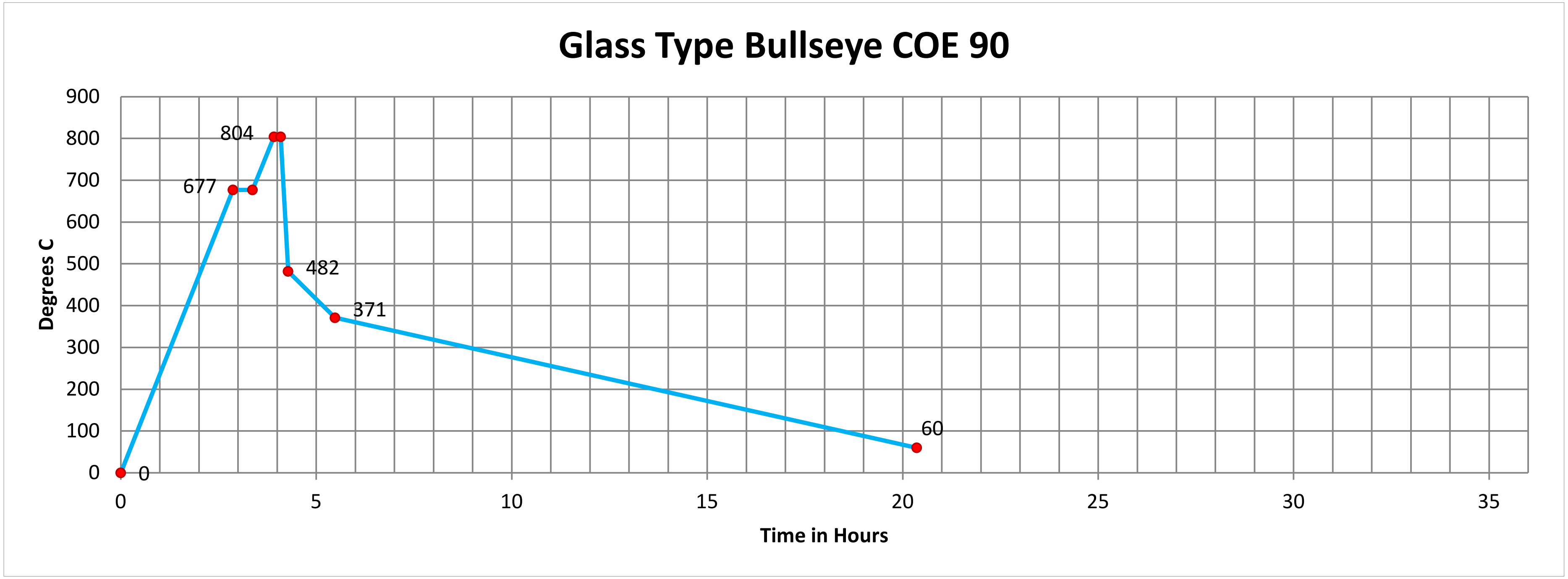
6:14 27:05:2013 *Boat Artwork: Once again silk fibre is the main inclusion type. In this artwork the red void edge creates a well defined boundary over the yellow. The blue and green void appears softer due to the matching of the manipulation forms with the void edge.*

6:15 27:05:2013 *Aloha Artwork: The highest degree of softness attainable without exposing the silk fibre through an opening within the void. Analogous colour schemes of felted silk fibres contained within separate void forms which gently overlap each other.*

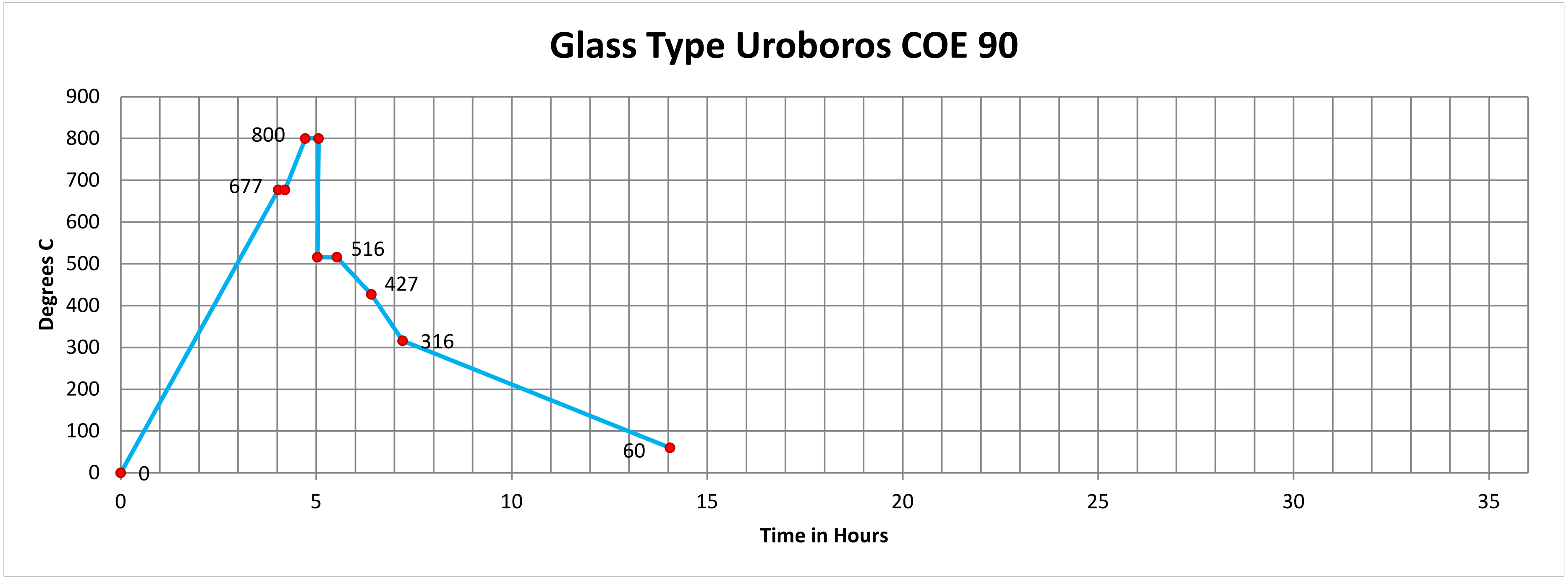
6:16 27:05:2013 *Throughout this research I have struggled to firmly place my work in a specific context... I could argue fine art but I would fall right into the art and craft debate as both glass and textiles are regarded as craft... but the glass art work of Josef Albers was exhibited in the Tate Modern in 2006 and artist Patrick Heron created a glass window as a permanent feature at the Tate St. Ives gallery... There was also Marcel Duchamp in 1923 (The Bride Stripped Bare by Her Bachelors, Even) made from glass. Tracey Emin's bed (My Bed) and tent (Everyone I Have Ever Slept With) are both made from textiles yet I feel uncomfortable about presenting my work as contemporary art... I don't even like contemporary art I prefer paintings from the impressionists, all about catching the moment... that's why I guess I like Michael Adam's work. Clearly I have made technical advances in fusing and slumping but I feel there are too many textiles within the work to call it contemporary glass... This finding of softness takes me back to textiles softness as a textile property... Yes this has helped, I feel comfortable with textiles it is where I am from, textile art and textile sculptures... it feels right, it is where I started from with my textile degree... it fits the textile focus of where my practice is at this moment and gives me a definite direction, I can visualise my work in textile art exhibitions... Ideas are running through my head like crazy... I must concentrate and finish my thesis off... Amazing how this context has just made so much sense...true it has been there since the beginning but it did not feel real until now... just one word softness that's all it took... and that came from a failure... I feel so happy... since last year things have been so good.*



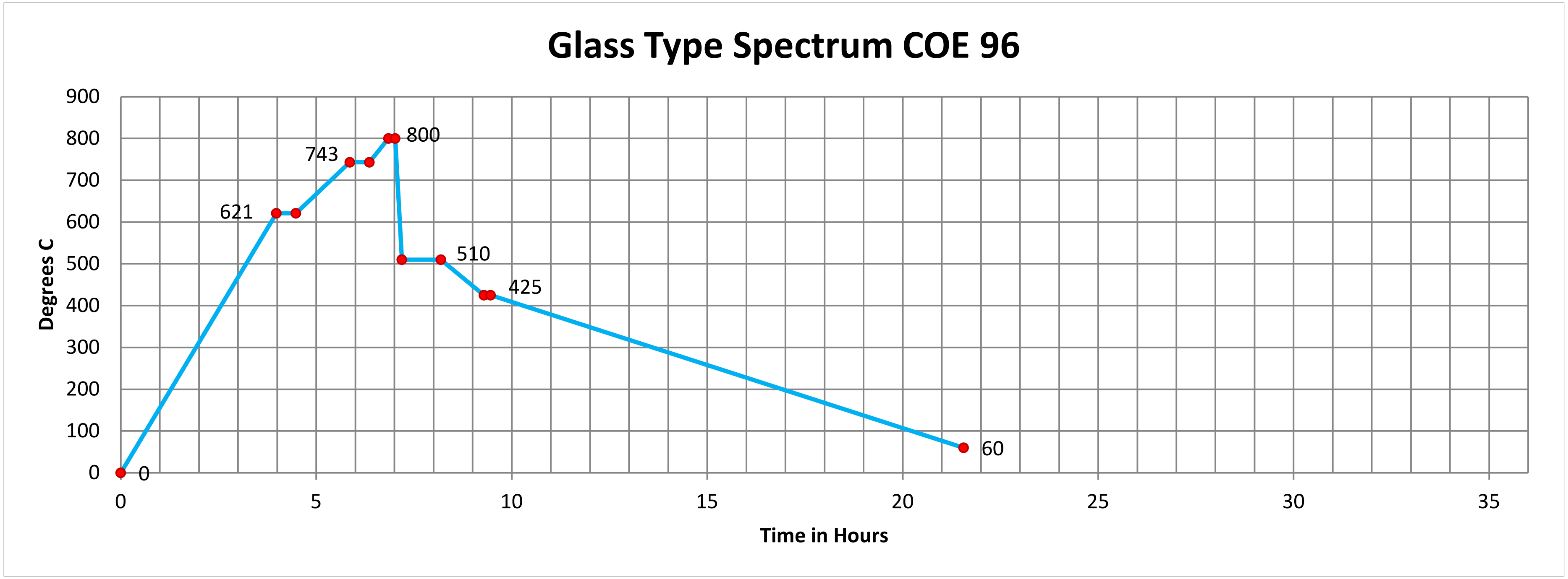
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	300	550	0	1.53	Standard Arista Firing Schedule (Scott AG, 2008)
2	Rapid Heating	999	820	10	2.19	
3	Unreg Anneal	999	546	0	2.35	
4	Stress Anneal	33	480	0	4.35	
5	Unreg Anneal	30	60	0	18.35	



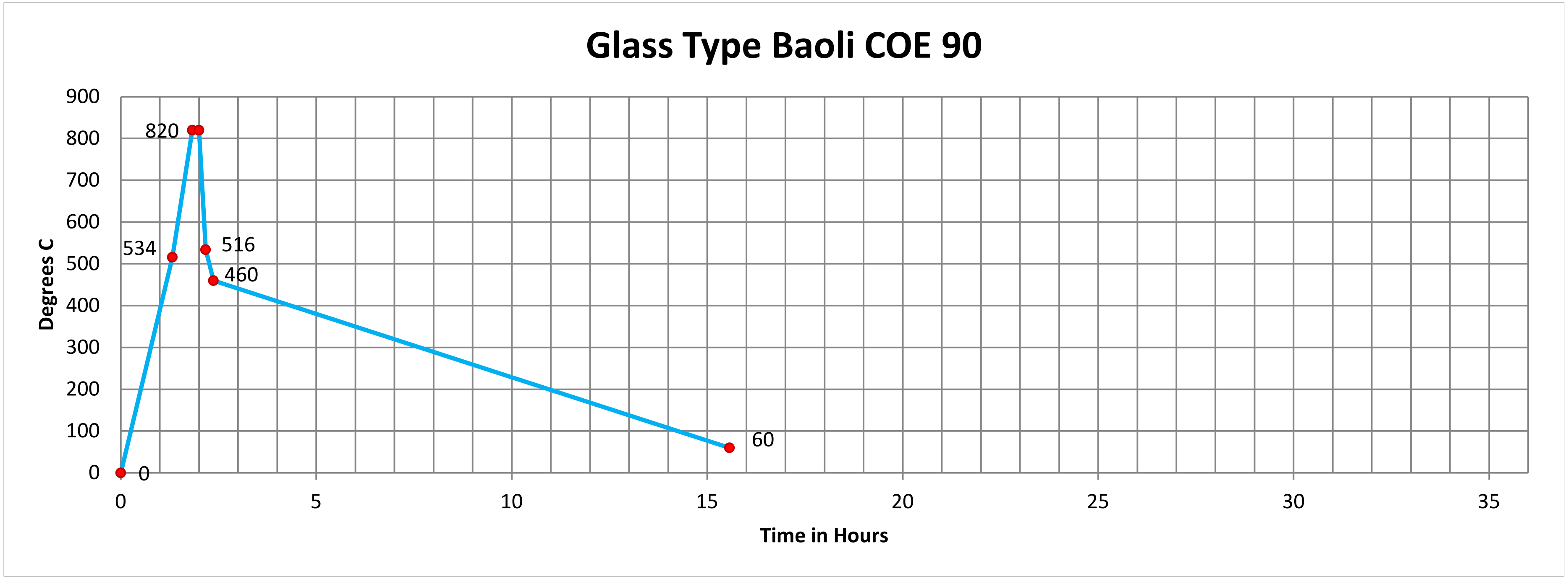
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	222	677	30	3.37	Standard Bullseye Firing Schedule (Bullseye, 2008)
2	Rapid Heating	333	804	10	4.09	
3	Unreg Anneal	999	482	0	4.28	
4	Stress Anneal	83	371	0	5.48	
5	Unreg Anneal	21	60	0	20.36	



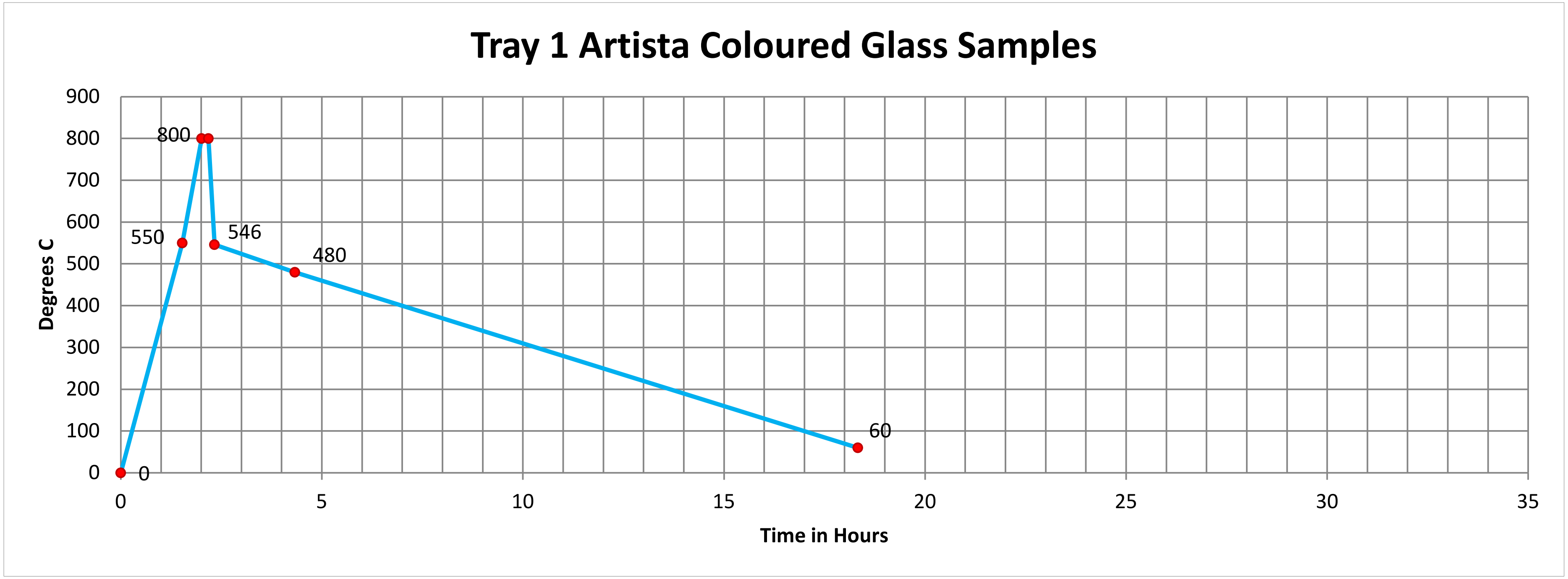
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	166	677	10	4.20	Standard Uroboros Firing Schedule (Uroboros, 2008)
2	Rapid Heating	278	800	20	5.06	
3	Unreg Anneal	999	516	30	5.53	
4	Stress Anneal	111	427	0	6.41	
4a	Stress Anneal 2	166	316	0	7.21	Segment Added
5	Unreg Anneal	38	60	0	14.05	



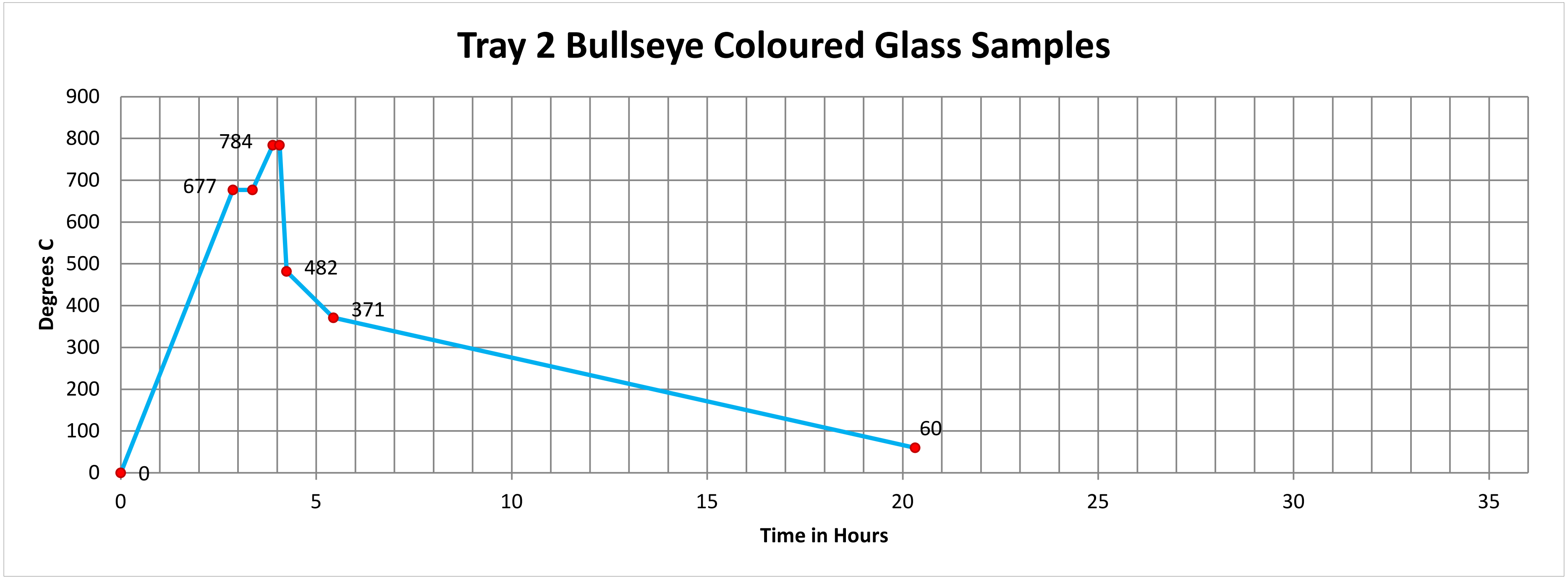
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	148	621	30	4.48	Standard Spectrum 96 Firing Schedule (Spectrum, 2008)
1a	Air Squeeze	93	743	30	6.36	Segment Added
2	Rapid Heating	204	800	10	7.02	
3	Unreg Anneal	999	510	60	8.19	
4	Stress Anneal	66	425	10	9.46	
5	Unreg Anneal	30	60	0	21.56	



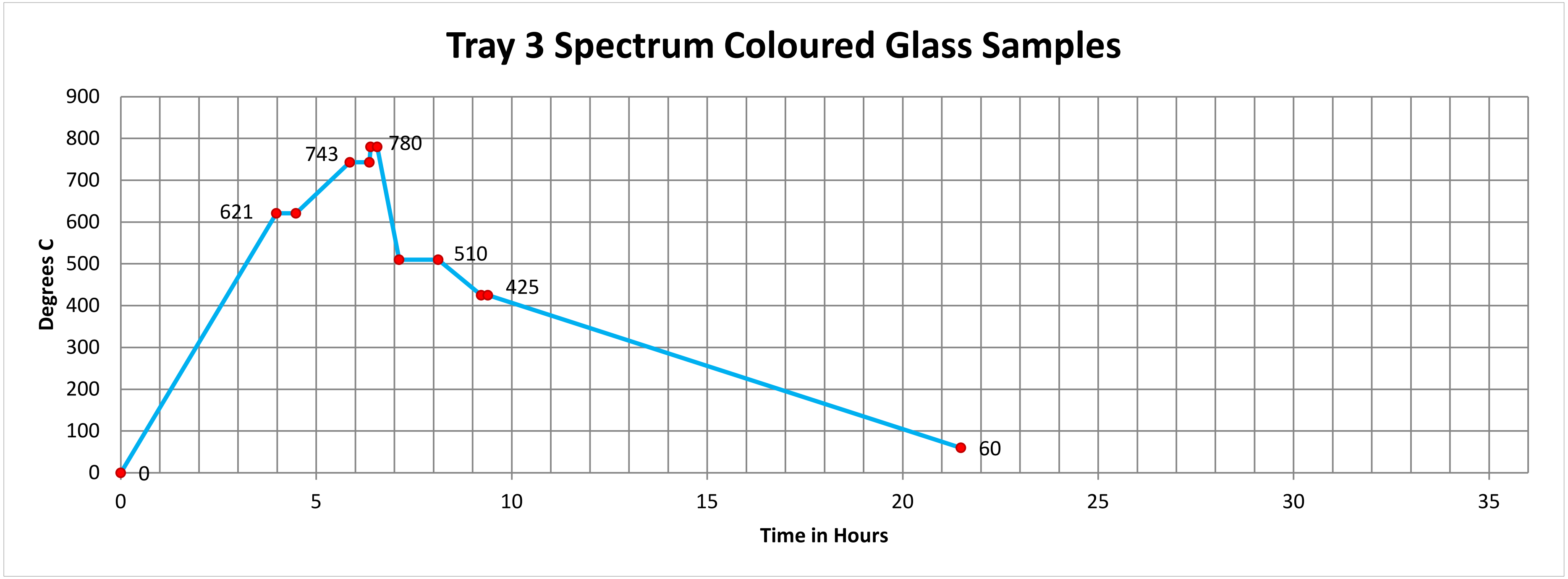
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	344	516	0	1.32	Standard Baoli Firing Schedule (Baoli, 2008)
2	Rapid Heating	999	820	10	2.0	
3	Unreg Anneal	999	534	0	2.17	
4	Stress Anneal	222	460	0	2.37	
5	Unreg Anneal	30	60	0	15.57	



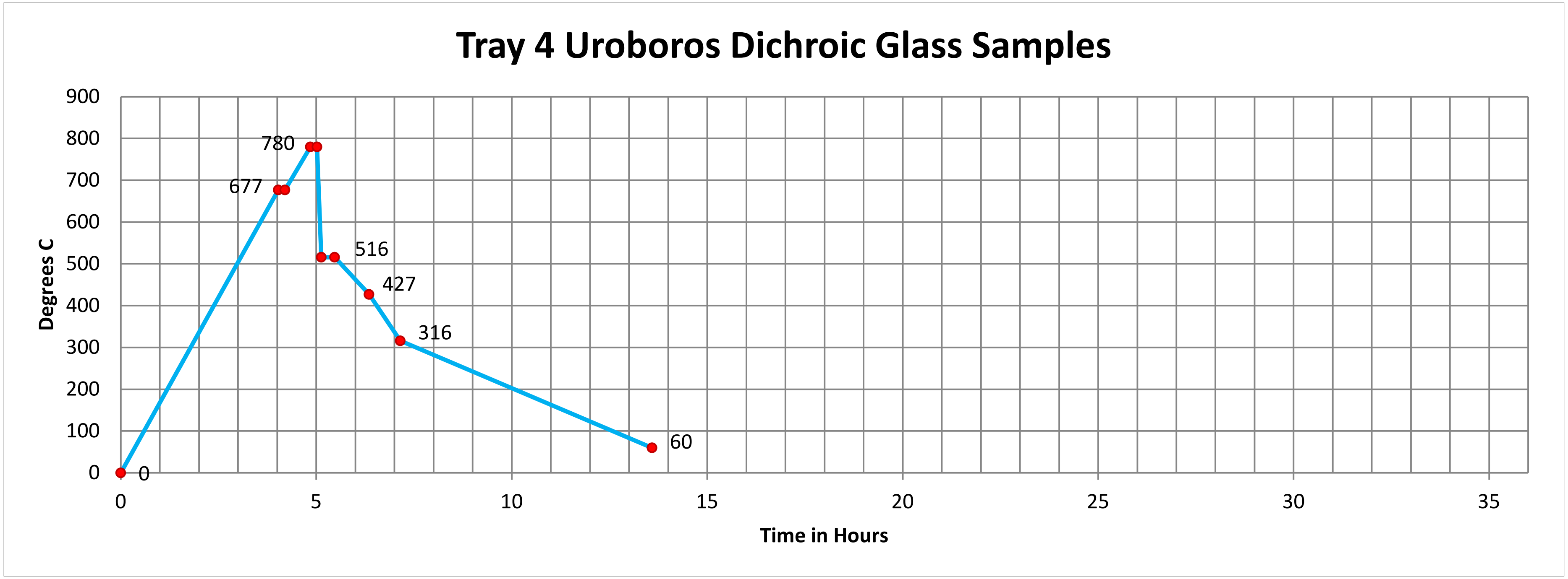
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	300	550	0	1.53	
2	Rapid Heating	999	800	10	2.18	Amend 820 to 800 because of small size
3	Unreg Anneal	999	546	0	2.33	
4	Stress Anneal	33	480	0	4.33	
5	Unreg Anneal	30	60	0	18.33	



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	222	677	30	3.37	
2	Rapid Heating	333	784	10	4.06	Amend 804 to 784 because of small size
3	Unreg Anneal	999	482	0	4.24	
4	Stress Anneal	83	371	0	5.44	
5	Unreg Anneal	21	60	0	20.32	



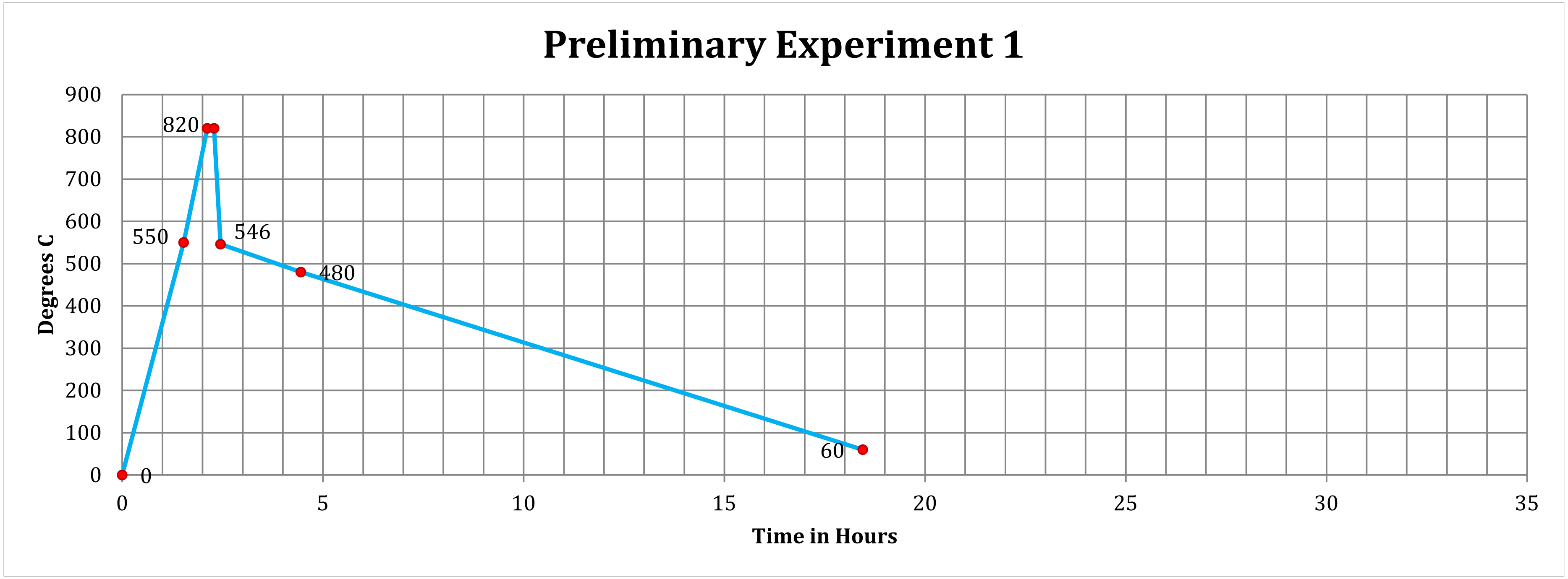
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	148	621	30	4.48	
1a	Air Squeeze	93	743	30	6.36	
2	Rapid Heating	204	780	10	6.56	Amend 800 to 780 because of small size
3	Unreg Anneal	999	510	60	8.12	
4	Stress Anneal	66	425	10	9.39	
5	Unreg Anneal	30	60	0	21.49	



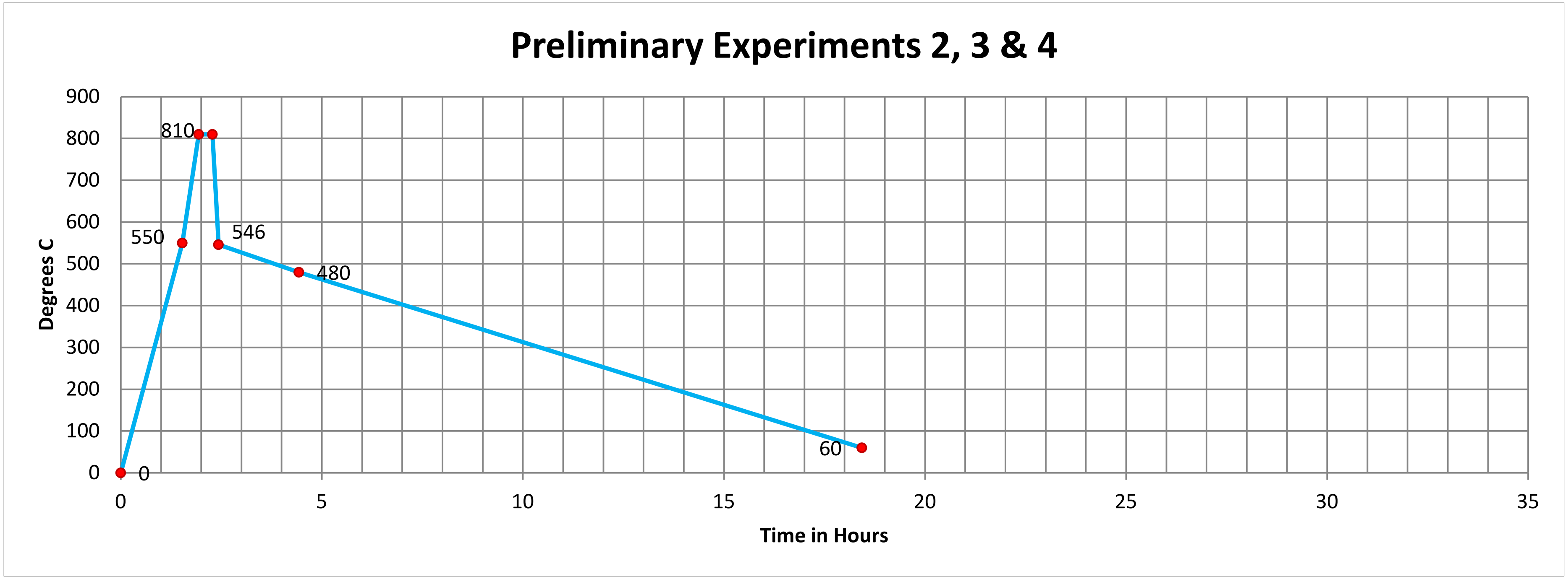
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	166	677	10	4.20	
2	Rapid Heating	278	780	20	5.02	Amend 800 to 780 because of small size
3	Unreg Anneal	999	516	30	5.47	
4	Stress Anneal	111	427	0	6.35	
4a	Stress Anneal 2	166	316	0	7.15	
5	Unreg Anneal	38	60	0	13.59	

Table Showing Anticipated Unique Aesthetic Qualities (Based On Colour, Glass and Inclusions)

	Inclusion Type	Inclusion Size	Inclusion Manipulation
Glass Void Form	1 Contrast of Hue Light/Dark Contrast Saturation Contrast Complementary Contrast	2 Light/Dark Contrast Contrast of Extension	3 Light/Dark Contrast Cold/Warm Contrast
	4 Colour Harmony	5 Simultaneous Pattern	6 Colour Direction
	7 Transparency and Colour Reflection and Colour	8 Optical Colour Mixing	9 Reflection and Colour
Glass Void Spacing	10 Contrast of Hue Light/Dark Contrast Cold/Warm Contrast Complementary Contrast	11 Contrast of Extension	12 Light/Dark Contrast
	13 Colour Harmony	14 Simultaneous Pattern	15 Colour Direction
	16 Transparency and Colour Reflection and Colour	17 Optical Colour Mixing	18 Reflection and Colour
Glass Void Layering	19 Contrast of Hue Light/Dark Contrast Cold/Warm Contrast Saturation Contrast Complementary Contrast	20 Contrast of Extension	21 Light/Dark Contrast
	22 Colour Harmony	23 Simultaneous Pattern	24 Colour Direction
	25 Transparency and Colour Reflection and Colour	26 Optical Colour Mixing	27 Reflection and Colour



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	300	550	0	1.53	
2	Rapid Heating	999	820	20	2.29	Amend 10 mins to 20 mins due to 3 glass layers
3	Unreg Anneal	999	546	0	2.45	
4	Stress Anneal	33	480	0	4.45	
5	Unreg Anneal	30	60	0	18.45	



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	300	550	0	1.53	
2	Rapid Heating	999	810	20	2.28	Amend 820 to 810 to reduce heat to top edges
3	Unreg Anneal	999	546	0	2.43	
4	Stress Anneal	33	480	0	4.43	
5	Unreg Anneal	30	60	0	18.43	

Kiln Specification

- Size - Internal usable dimensions of 1550mm by 1050mm by 270mm high.
- Height from floor to kiln brick top surface 32 inches.
- KW -16 (approx 70 amp single phase)
- Stafford 315 A
- Two Adjustment Controllers
- Policeman contactor
- Cut out when open.
- 3 Zone control connected to 5 Thermocouples
- Elements to run lengthways ie. 1550mm
- 3 spy/vent holes in front
- 3 spy/vent holes in rear
- Mild steel sides
- Non refractory linings
- Kiln shelf
- Access: Through 3 doorways smallest doorway is 700mm.

Power to be installed by Certified Electricians

- 25mm diameter copper cable 25 metres long
- RCB Cut Out
- Rotary Switch Gear Box

COTTON DYE RECIPES - TOP CHART

W = Water Y = Yellow M = Magenta B = Blue D = Drops All other quantities in mls.

7.5Y	6W 3Y 1DM	5W 3Y 1DM	5W 3Y 2DM	5W 3Y 3DM	5W 3Y 5DM	3W 1.5Y 4DM	5W 3Y 4DM	3W 1.5Y 0.5M	2.5W 4.5Y 1.5M
2.5W 2Y 3M	2.5W 2.5Y 1.5M	2.5W 3Y 1.5M	3W 1.5Y 1.75M	3W 1.5Y 1.5M	2.5W 3.5Y 1.5M	3W 1.5Y 1M	3W 1.5Y 1.25M	2.5W 4Y 1.5M	3W 1.5Y 0.75M
2W 3Y 3M	2W 2Y 3M	2.5W 1Y 3M	2.5W 1.5Y 3M	2.5W 12DY 3M	2.5W 8DY 3M	2.5W 5DY 3M	3M	2.5W 0.5Y 3M	2.5W 8M 1DB
2.5W 3M 0.5B	2.5W 3M 0.25B	2.5W 3M 15DB	2.5W 3M 12DB	2.5W 3M 10DB	2.5W 3M 8DB	2.5W 3M 5DB	2.5W 3M 4DB	2.5W 3M 3DB	2.5W 3M 2DB
2.5W 3M 0.75B	2.5W 3M 1B	2.5W 3M 1.25B	2.5W 3M 1.5B	2.5W 3M 1.75B	2.5W 3M 2B	2.5W 2.5M 2.25B	2.5W 2.5M 2.5B	2.5W 4.5M 2B	2.5W 4M 2.5B
2.5W 0.75M 3B	2.5W 1M 2.5B	2.5W 1.25M 2.5B	2.5W 1.5M 2.5B	2.5W 1.75M 2.5B	2.5W 2M 2.5B	2.5W 2.25M 2.5B	2.5W 2.5M 2.5B	2.5W 3M 2.5B	2.5W 3.5M 2.5B
2.5W 0.25M 3B	2.5W 0.5M 3B	2.5W 10DM 3B	2.5W 6DM 3B	2.5W 4DM 3B	2.5W 2DM 3B	2.5W 3B	2.5W 3DY 3B	2.5W 10DY 3B	2.5W 12DY 3B
2.5W 2.25Y 3B	2.5W 2Y 3B	2.5W 1.75Y 3B	2.5W 1.5Y 3B	2.5W 1.25Y 3B	2.5W 1Y 3B	2.5W 0.75Y 3B	2.5W 0.5Y 3B	2.5W 0.25Y 3B	2.5W 15DY 3B
2.5W 2.5Y 3B	2.5W 3Y 3B	2.5W 3Y 2.5B	2.5W 3.5Y 3B	2.5W 3Y 2B	2.5W 4Y 3B	2.5W 3Y 1.5B	2.5 3Y 1.25B	3W 3Y 1B	3W 3Y 0.75B
25W 30DY 3DM	25W 10DY 2DM	25W 20DY 3DM	25W 5DY 2DM	3W 3Y 1DB	3W 3Y 3DB	3W 3Y 2DB	3W 3Y 8DB	3W 3Y 5DB	3W 3Y 0.5B

COTTON DYE RECIPES - BOTTOM CHART

W = Water Y = Yellow M = Magenta B = Blue D = Drops All other quantities in mls.

25W 40DY 1DM 2DB	4.5W 2.5Y 3DM 1DB	3.5W 2.5Y 3DM 2DB	3.5W 2.5Y 4DM 3DB	3.5W 2.5Y 4DM 2DB	3.5W 2.5Y 6DM 2DB	3.5W 2.5Y 10DM 2DB	3.5W 2.5Y 12DM 2DB	3.5W 2.5Y 2DM 4DB	3.5W 2.5Y 2DM 6DB
2.5W 8DY 2.5M 2DB	2.5W 6DY 2.5M 2DB	2.5W 4DY 2.5M 2DB	3.5W 2.5Y 2DM 18DB	3.5W 2.5Y 2DM 20DB	3.5W 2.5Y 2DM 16DB	3.5W 2.5Y 2DM 14DB	3.5W 2.5Y 2DM 12DB	3.5W 2.5Y 2DM 10DB	3.5W 2.5Y 2DM 8B
2.5W 12DY 2.5M 2DB	2.5W 10DY 2.5M 3DB	4W 20DY 2.5M 3DB	4W 10DY 2.5M 4DB	10W 2Y 1M	2.5W 20DY 2.5M 2DB	2.5W 10DY 2.5M 2DB	10W 2Y 1M 0.5B	10W 2Y 1M 1B	10W 2Y 1M 1.5B
6W 1.5Y 1.5M 1.5B	10W 1.5Y 1.5M 1.5B	20W 1.5Y 1.5M 1.5B	30W 1.5Y 1.5M 1.5B	15W 1.5Y 1.5M 1.5B	35W 1.5Y 1.5M 1.5B	25W 1.5Y 1.5M 1.5B	10W 2Y 1M 3B	10W 2Y 1M 2.5B	10W 2Y 1M 2B
4W 1.5 Y 1.5M 1.5B	3W 1.5Y 1.5M 1.5B	2W 1.5Y 1.5M 1.5B	1.5W 1.5Y 1.5M 1.5B	5W 3Y	6W 3Y	7W 3Y	8W 3Y	9W 3Y	10W 3Y
6W 2DM	6W 1DM	10W 1DM	20W 1DM	50W 0.5Y	40W 0.5Y	30W 0.5Y	20W 0.5Y	10W 0.5Y	50W 1Y
20W 0.25M	18W 0.25M	16W 0.25M	14W 0.25M	12W 0.25M	10W 0.25M	9W 0.25M	8W 0.25M	7W 0.25M	5W 0.25M
8W 3B	8W 3.5B	8W 4B	8W 4.5B	8W 5B	8W 8B	5B	3W 0.25M	4W 0.25M	6W 0.25M
8W 2.5B	8W 2B	8W 1.5B	8W 1B	8W 0.75B	8W 0.5B	8W 0.25B	8W 15DB	8W 12DB	8W 10DB
8W 1DB	20W 1DB	10W 2DB	8W 3DB	8W 4DB	8W 5DB	8W 6DB	8W 7DB	8W 8DB	8W 9DB

SILK FIBRE ACID DYE COLOUR CHART

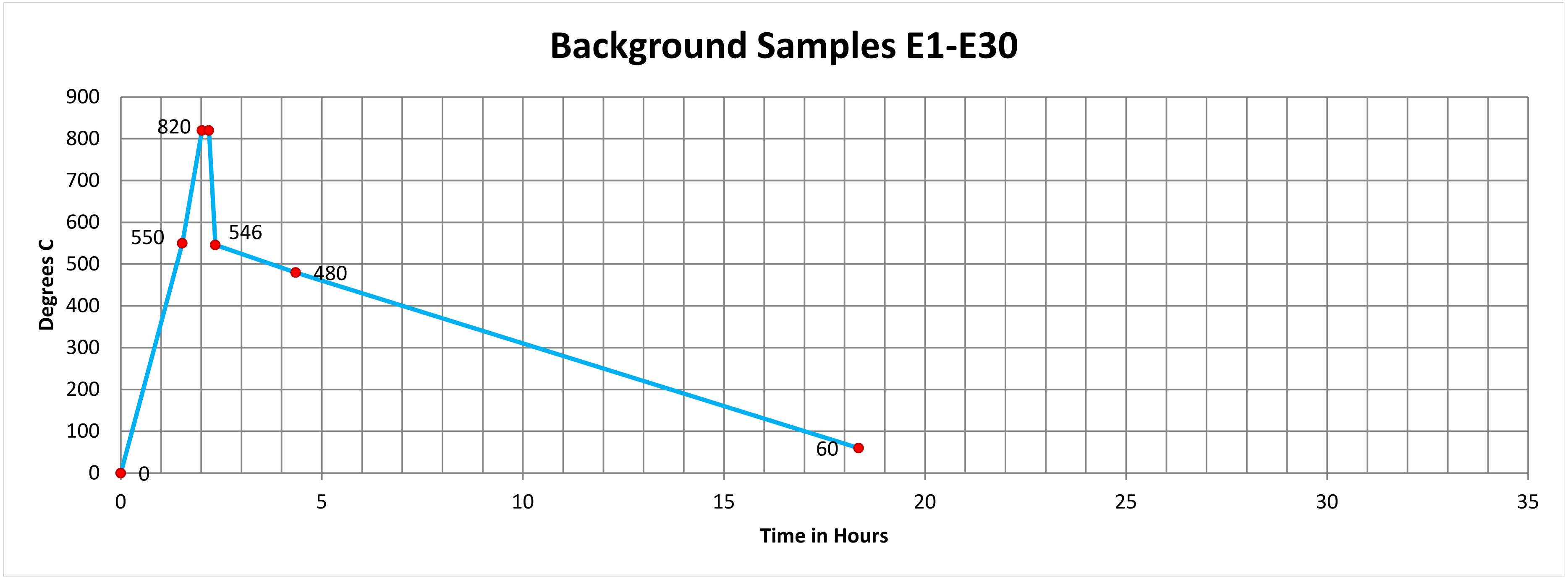
Material: Cultivated Silk Laps

Acid Dye Solution = 1 gram per 0.5 litre + 5mls White Vinegar

LY = Lemon Yellow (George Weil) GY = Golden Yellow (George Weil)
RB = Royal Blue (George Weil) BG = Bright Green (George Weil)
N = Navy (Jacquard) T = Turquoise (Jacquard)

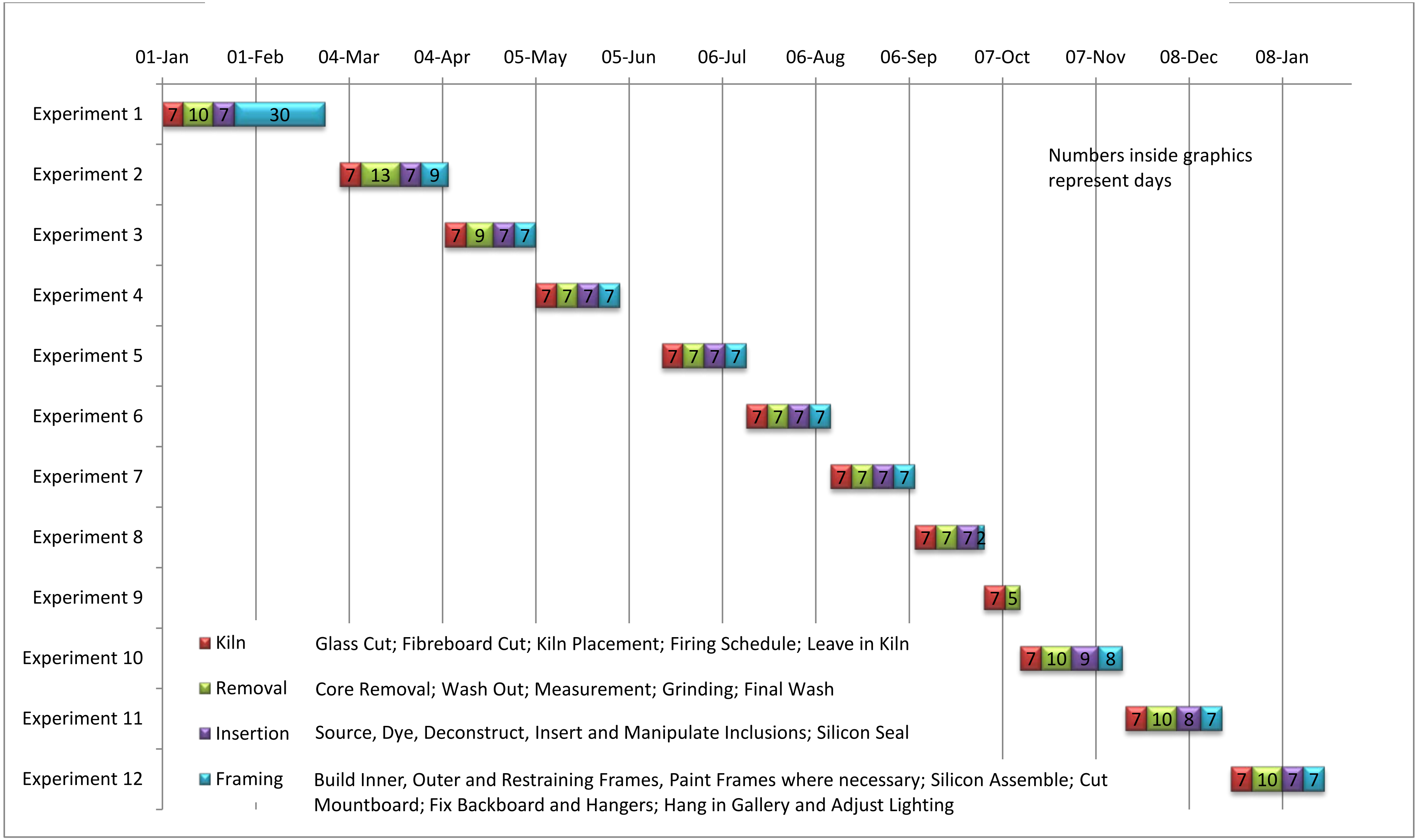
D = Drops All other quantities in mls.

N2 LY8	N3 LY7	N4 LY6	N5 LY5	N6 LY4	N7 LY3	N8 LY2	N9 LY1	N10
RB3 GY5D	RB3 LY9D	RB3 LY4D	RB3 GY4D	RB3 GY3D	RB3 LY1D	RB3 GY2D	RB10	RB3 GY1D
RB9 GY1	RB3 LY9D	RB3 GY9D	RB3 LY8D	RB3 GY8D	RB3 LY7D	RB3 LY5D	RB3 GY7D	RB3 GY6D
RB9 LY1	RB8 GY2	RB8 LY2	RB7 LY3	RB7 GY3	RB6 GY4	N3 LY9D	RB5 GY5	RB6 LY4
RB4 LY6	RB4 GY6	RB3 GY7	N1 LY9	RB3 LY7	RB2 LY8	RB2 GY8	RB1 LY9	RB1 GY9
T3 LY8D	T3 LY5D	T3 LY6D	T1 LY9	T3 LY4D	T3 LY3D	T3 LY7D	T3 LY2D	T3 LY1D
BG1 LY9	T2 LY8	BG2 LY8	BG4 LY6	BG6 LY4	BG7 LY3	BG8 LY2	T3 LY7	T5 LY5
LY10	GY10	T10	T9 LY1	BG10	T8 LY2	T7 LY3	T6 LY4	T4 LY6

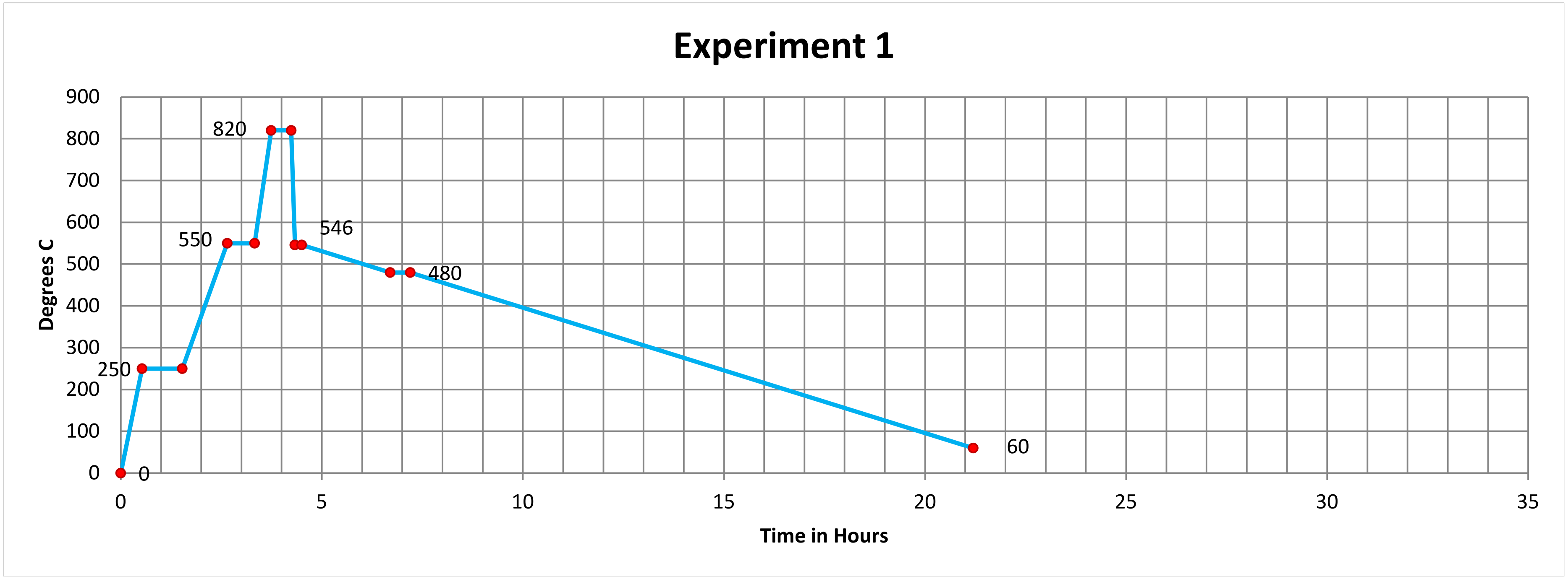


Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating	300	550	0	1.53	Based on Artista Specification
2	Rapid Heating	999	820	10	2.19	
3	Unreg Anneal	999	546	0	2.35	
4	Stress Anneal	33	480	0	4.35	
5	Unreg Anneal	30	60	0	18.35	

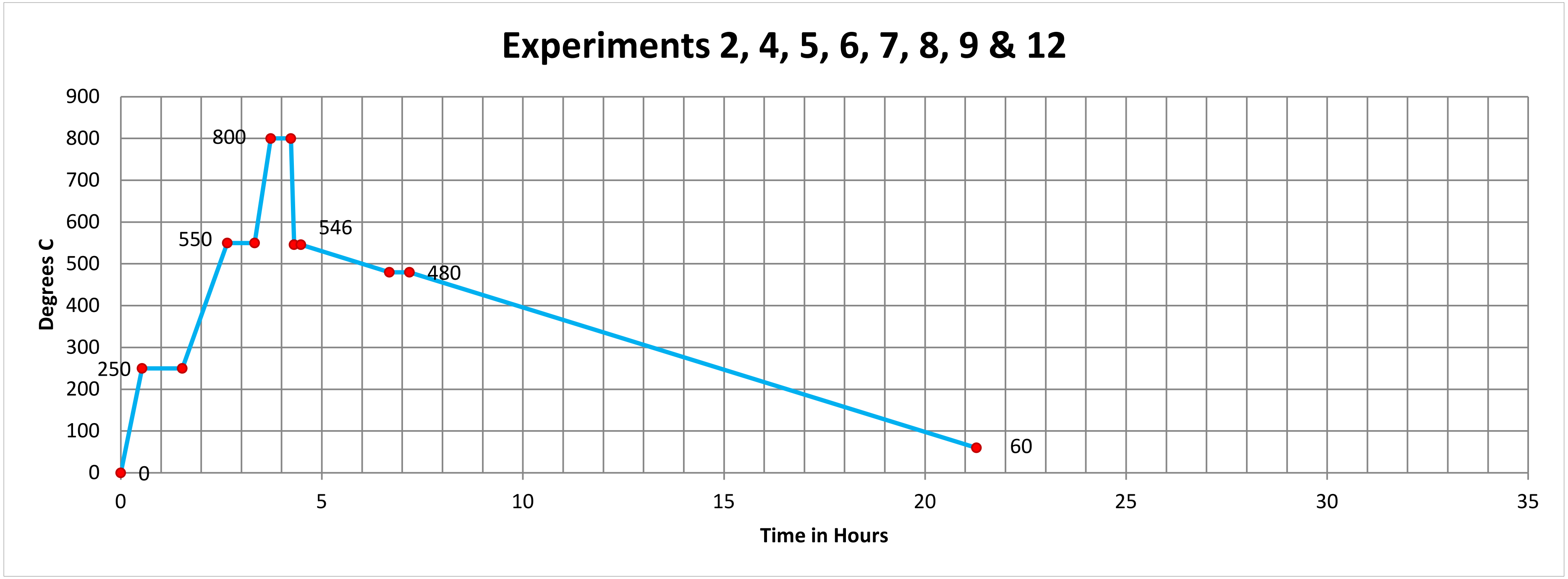
Experiments 1-12 (2008/2009) Timeline



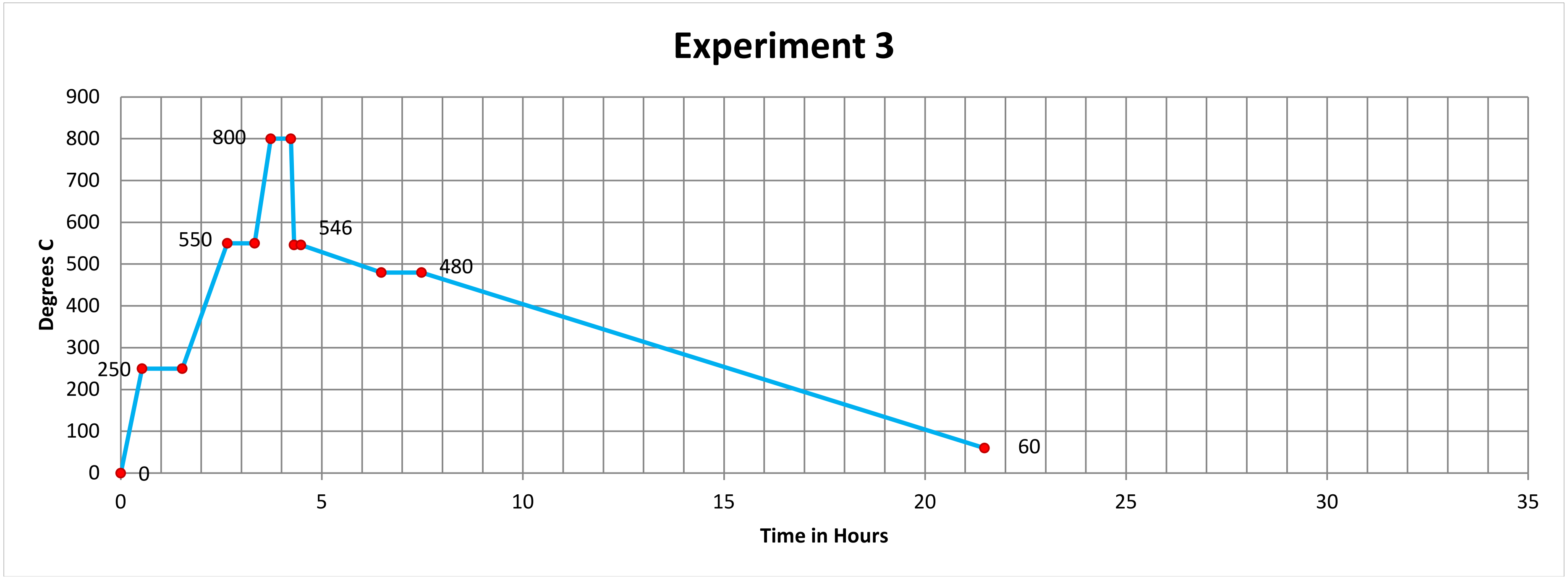
Appendix 19



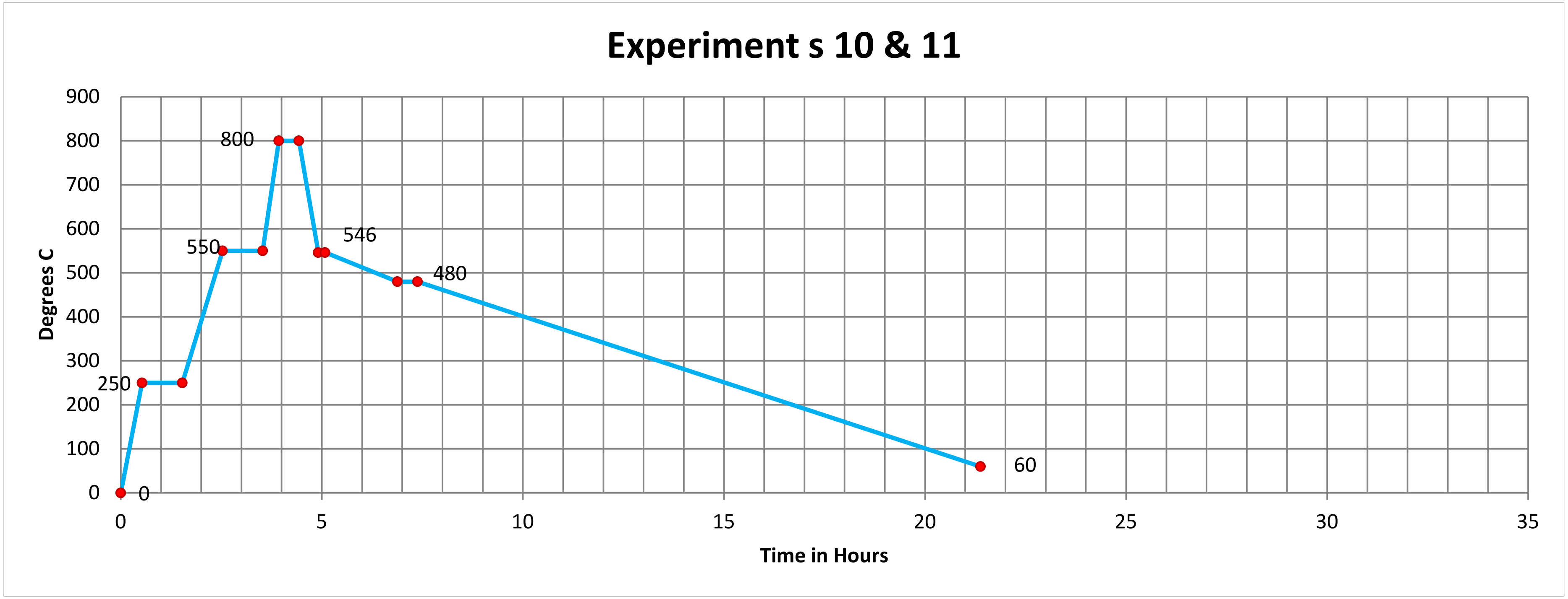
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	300	250	60	1.53	Hold to Allow Even Heat Distribution
1a	Controlled Heating 2	300	550	40	3.33	Hold to Allow Gas Squeeze & Even Heat Distribution
2	Rapid Heating	750	820	30	4.24	Reduce to 750°C because of larger size glass
3	Unreg Anneal	999	546	10	4.50	Hold to Allow Even Temperature Distribution
4	Stress Anneal	33	480	30	7.20	Hold to Allow Even Temperature Distribution
5	Unreg Anneal	30	60	0	21.20	



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	300	250	60	1.53	
1a	Controlled Heating 2	300	550	40	3.33	
2	Rapid Heating	750	800	30	4.23	Reduce 820°C to 800°C to reduce heat at void edges
3	Unreg Anneal	999	546	10	4.48	
4	Stress Anneal	33	480	30	7.18	
5	Unreg Anneal	30	60	0	21.18	



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	300	250	60	1.53	
1a	Controlled Heating 2	300	550	40	3.33	
2	Rapid Heating	750	800	30	4.23	
3	Unreg Anneal	999	546	10	4.48	
4	Stress Anneal	33	480	60	7.48	Increase Hold to 60 min because of larger glass size
5	Unreg Anneal	30	60	0	21.48	



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	300	250	60	1.53	
1a	Controlled Heating 2	300	550	60	3.53	Hold time to 60 mins to allow Complex Gas Squeeze
2	Rapid Heating	750	800	30	4.43	
3	Unreg Anneal	999	546	10	5.08	
4	Stress Anneal	33	480	30	7.38	
5	Unreg Anneal	30	60	0	21.38	

Experiments 1-12 Technical Principles

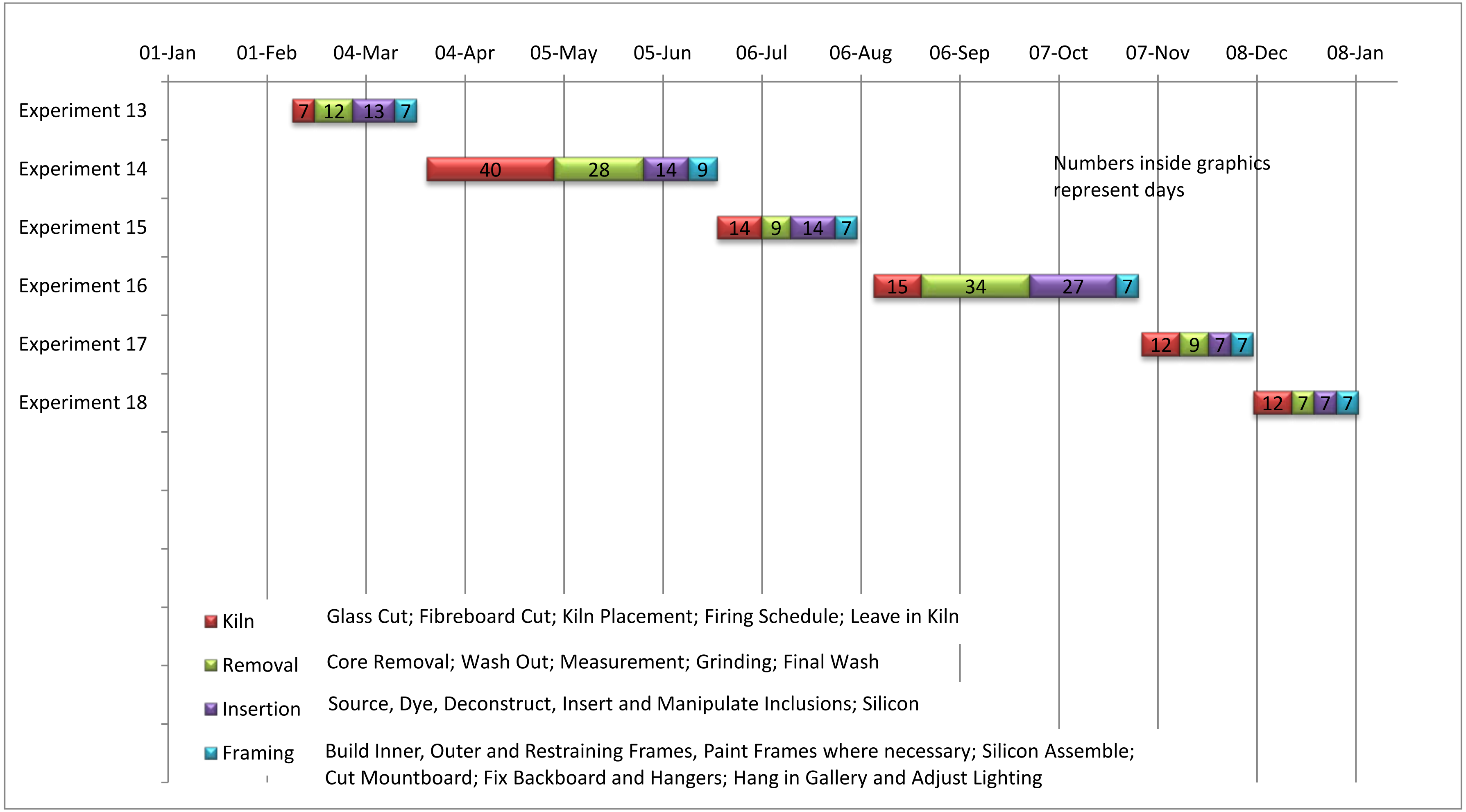
#	Description	Experiment
1	Optimal Top Process Temperature for small sized glass with a surface area between 750cm² and 2000cm²) must be less than 820°C.	1
2	Holding times need to be added to segments 1 and 1a to allow the gases to escape from the layers within the glass.	1
3	Holding times need to be added to segments 3 and 4 to allow for even distribution of heat within the glass.	1
4	Overlapping lower void strips with upper void strips by at least 50% causes the core material to slip during the firing process, altering the reflection angle of the surface of the void form, which decreases the colour intensity if the artwork is illuminated from above.	1
5	The optimum maximum process temperature in segment 2 is 800°C to prevent overheating of void edges and closing of the voids.	2
6	Figurative void shapes slumped in the base layer should be left transparent	2
7	The greater the void space the greater the glass mass which, if greater than 9mm will seek to find its own level at 6mm and cause bulging beyond the boundary size of the glass.	2
8	Larger widths of glass require an extension of the stress annealing hold time in segment 4 of the firing schedule.	3
9	Overlapping lower void strips with upper void strips by at least 50% causes the core material to slip during the firing process, altering the reflection angle of the surface of the void form, which increases the colour intensity if the artwork is illuminated from the side.	3
10	The top void layer can be positioned internal, external or overlapping the perimeter of the lower void layer. Top layer void form can meander across more than one lower void form or it could be contained within its perimeter and bisected.	3
11	The inclusion of coloured glass (D1572 which has a different specification to clear glass (D0189) does not affect the firing schedule.	5
12	Coloured glass base increases the optical mixing of similar colour schemes in the upper void layer.	5
13	The inclusion of coloured glass (D4068) which has a different specification to clear glass (D0189) does not affect the firing schedule.	6
14	Only small amounts of transparent coloured glass are required to have a significant impact on the aesthetics of the final artwork.	6
15	Optical Mixing due to colour spread does not occur when the transparent coloured glass is located base layer.	6
16	Optical Mixing due to colour spread does occur when the transparent coloured glass is located in the second or third layer.	6

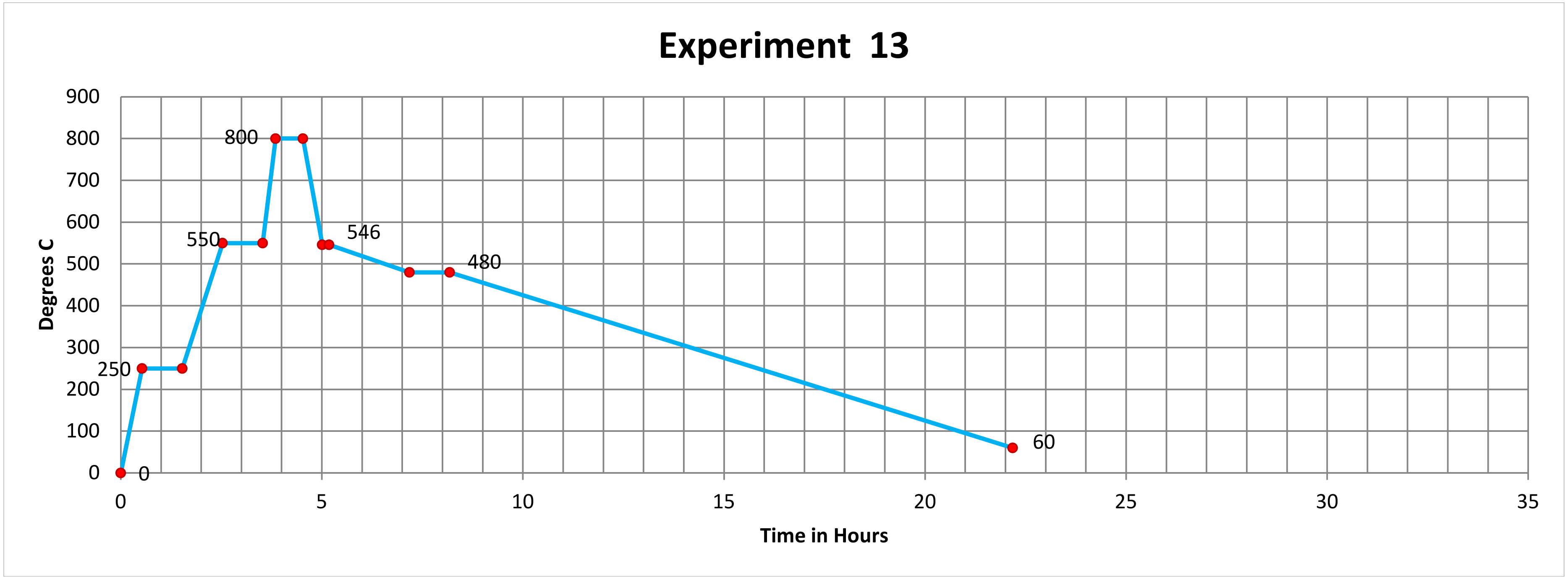
#	Description	Experiment
17	The use of straight edged opaque glass pieces should be avoided unless discord is a requirement of the artwork.	7
18	The use of a single layer complete voided form enhances the planes within the artwork.	7
19	Coloured frit placed on top of clear glass can be combined with a single void layer and fused using firing schedule Appendix 4.9	8
20	Coloured frit intensity creates a significant imbalance with void inclusion types	8
21	Clear glass boarders create difficulty if the artwork is to be framed	8
22	The thermal insulation of large areas of fibreboard absorbed the heat from the top elements of the kiln and causes the top layer of glass to overheat and become more viscose. This increased viscosity causes the glass to flow away due to gravity resulting in a very thin top layer of glass.	9
23	The thermal insulation of large areas of fibreboard prevents the heat from getting to the lower layers of glass preventing the voids to close off properly.	9
24	The angle of the knife blade must always be perpendicular to the fibreboard when cutting otherwise poor internal void edges will result.	10
25	The non void area must be of sufficient size to allow it to fully slump down to the lower void layers.	11
26	Larger void areas up to a maximum of 75 cm^2 can be produced successfully using the firing schedule Appendix 4.9.	12
27	Any inclusion type can be inserted into the glass voids provided it does not exceed 4 mm in depth and fits within the void width.	12

Experiments 1-12 Matrix Positions and Colour Theory

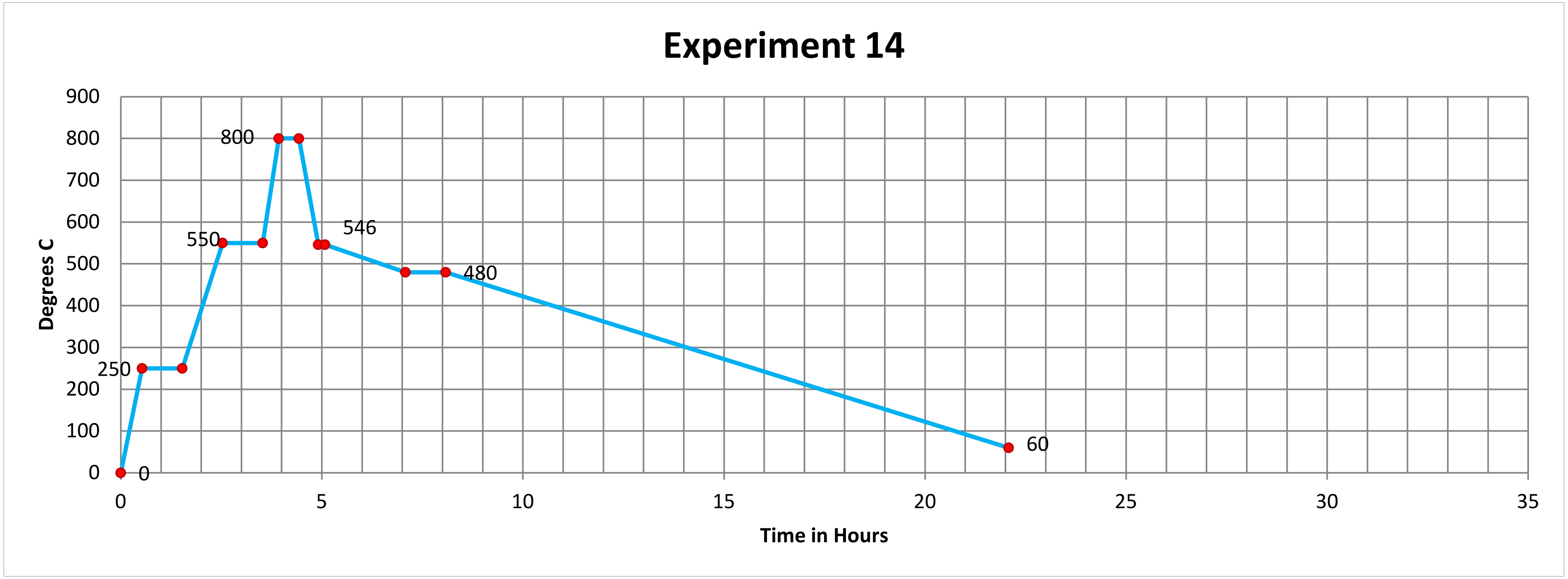
Matrix	Description	Experiment
1	Contrast of Hue (Void Form and Inclusion Type)	12
1	Light/Dark Contrast (Void Form and Inclusion Type)	10:11
1	Saturation Contrast (Void Form and Inclusion Type)	12
2	Light/Dark Contrast (Void Form and Inclusion Size)	2
2	Contrast of Extension (Void Form and Inclusion Size)	3
3	Light/Dark Contrast (Void Form and Inclusion Manipulation)	1:2
4	Colour Harmony (Void Form and Inclusion Type)	6:10
5	Simultaneous Pattern (Void Form and Inclusion Size)	5
6	Colour Direction (Void Form and Inclusion Manipulation)	2:4:6
7	Transparency and Colour (Void Form and Inclusion Type)	3:12
7	Reflection and Colour (Void Form and Inclusion Type)	3:12
8	Optical Colour Mixing (Void Form and Inclusion Size)	3:10
9	Reflection and Colour (Void Form and Inclusion Manipulation)	1:3
10	Light/Dark Contrast (Void Spacing and Inclusion Type)	3:6:7
15	Colour Direction (Void Spacing and Inclusion Manipulation)	5
16	Transparency and Colour (Void Spacing and Inclusion Type)	6
17	Optical Colour Mixing (Void Spacing and Inclusion Size)	5
19	Contrast of Hue (Void Layering and Inclusion Type)	3
19	Light/Dark Contrast (Void Layering and Inclusion Type)	11:12
19	Cold/Warm Contrast (Void Layering and Inclusion Type)	10
21	Light/Dark Contrast (Void Layering and Inclusion Manipulation)	1;2;4
22	Colour Harmony (Void Layering and Inclusion Type)	7
24	Colour Direction (Void Layering and Inclusion Manipulation)	1:3:8:10:11:12
26	Optical Colour Mixing (Void Layering and Inclusion Size)	1:7

Experiments 13-18 (2009/2010) Timeline



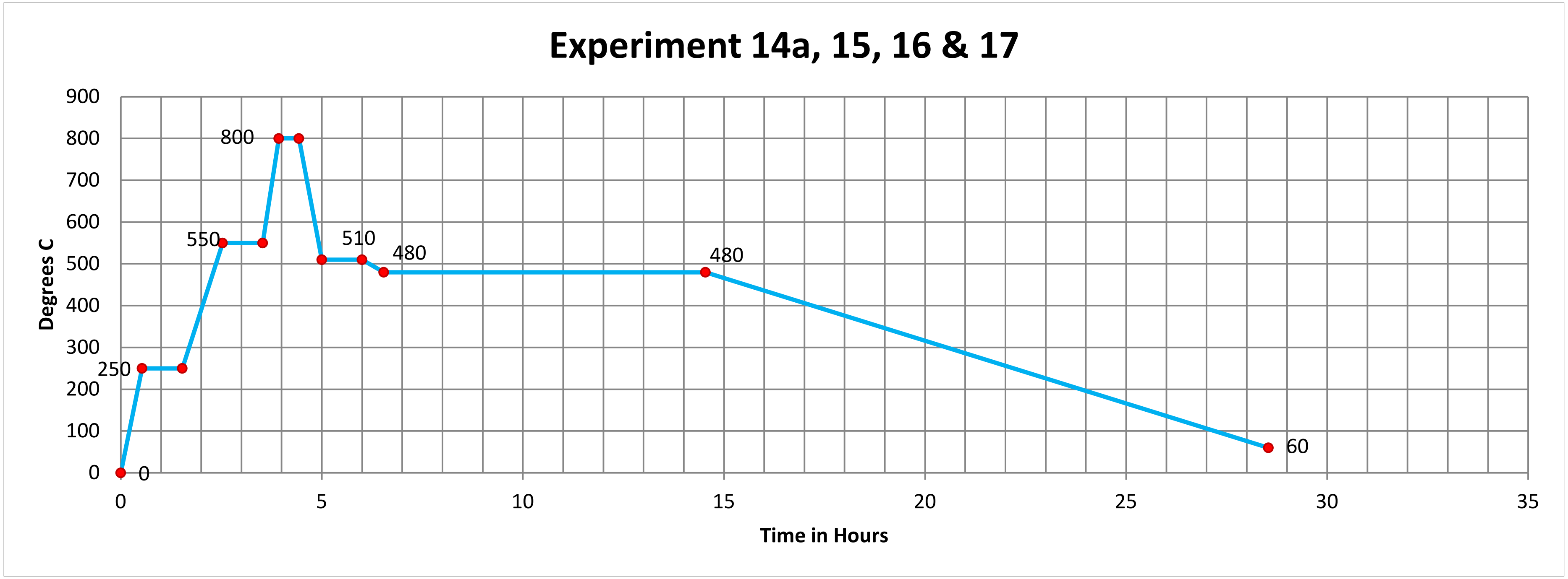


Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	300	250	60	1.53	
1a	Controlled Heating 2	300	550	60	3.53	
2	Rapid Heating	750	800	40	4.53	Increase Hold to 40 mins to flatten top surface
3	Unreg Anneal	999	546	10	5.18	
4	Stress Anneal	33	480	60	8.18	
5	Unreg Anneal	30	60	0	22.18	



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	300	250	60	1.53	
1a	Controlled Heating 2	300	550	60	3.53	
2	Rapid Heating	750	800	30	4.43	Decrease hold to 30 mins to create 3D top surface
3	Unreg Anneal	999	546	10	5.08	
4	Stress Anneal	33	480	60	8.08	
5	Unreg Anneal	30	60	0	22.08	

Appendix 28



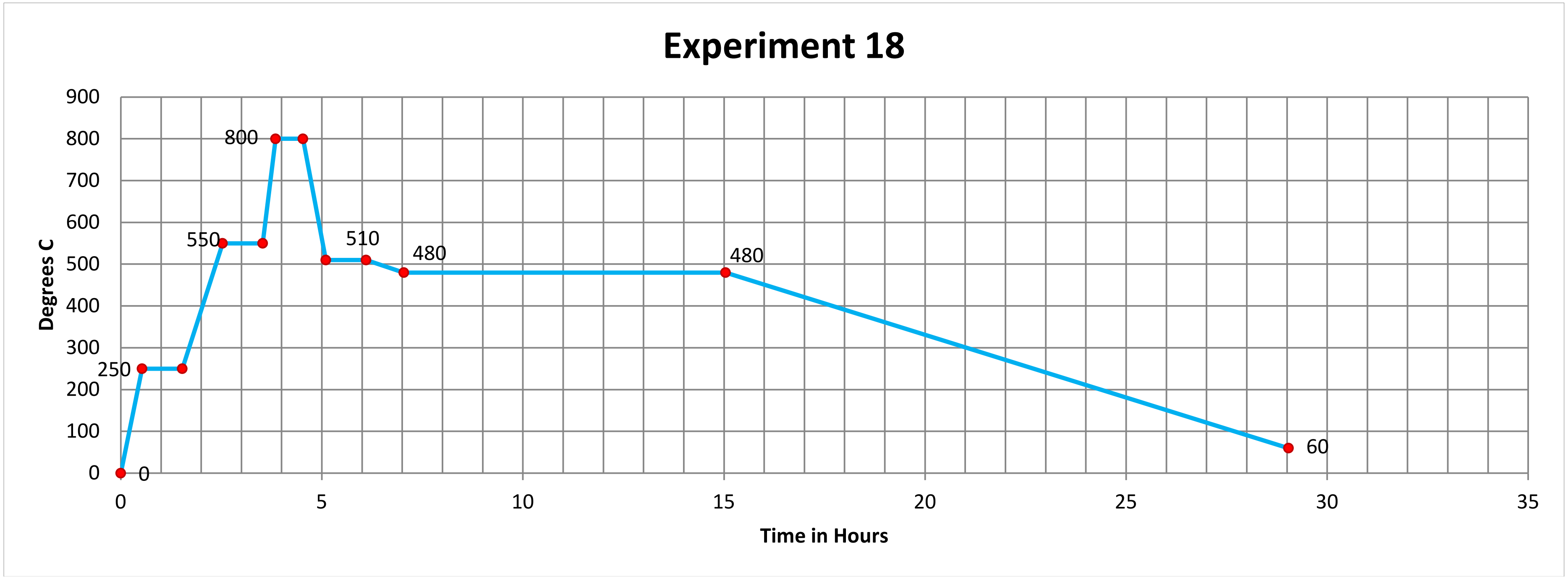
Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	300	250	60	1.53	
1a	Controlled Heating 2	300	550	60	3.53	
2	Rapid Heating	750	800	30	4.43	
3	Unreg Anneal	999	510	60	6.00	Decrease to 510°C Hold to 60 mins to ensure heat loss
4	Stress Anneal	33	480	480	14.54	Hold to 480 mins to extend annealing and ensure heat loss
5	Unreg Anneal	30	60	0	28.54	

Experiment 16: Task List and Time Sheet

	Design Processes	Time (hours)
1	Inspiration sketches, painting and photographs	7
2	Initial Composition	6
3	Simplify the design for access	4
4	Determine size for final design	0.5
5	Determine number of layers of glass in design	0.5
		18
	Core-forming Processes	
6	Cut glass pieces to size	1
7	Clean glass on all sides	1
8	Cut voids shapes from refractory board	9
9	Clean base layer of glass on both sides, place in kiln.	1
10	Place the lower level set of refractory boards on glass	2
11	Clean the middle glass layer on both sides	0.5
12	Place glass on refractory board in kiln	0.5
13	Place the upper level set of refractory boards on glass	2
14	Check overall design and for void spacing and alignment	1
15	Clean the top glass layer on both sides	0.5
16	Place glass on refractory board higher set in kiln	0.5
17	Photograph core-forming sandwich within kiln	0.5
18	Check for cleanliness and shut kiln	0.5
19	Design firing schedule	1
20	Programme kiln controller and set optimum start time	0.5
21	Fuse and Slump Glass	48
22	Open kiln and check core-formed glass for cracks	1
26	Grind off any sharp edges	6
27	Remove core material	275
28	Wash out and dry voids	8
29	Check with Stressometer	4
30	Perform visual inspection of web sections	1
		364.5

	Trapunto Processes	
31	Review design and identify colour combinations	4
32	Source recycled materials	48
33	Group colours	2
34	Chop recycled materials into small/medium/large chop sizes	6
35	Check for dryness	0.5
36	Store separate colours in airtight container	2
37	Source natural coloured silk fibres	1
38	Measure dye pigments precisely and record for swatches	4
39	Add dyes to silk fibre swatches	18
40	Steam silk fibre swatches	8
41	Dry silk fibre swatches	8
42	Match swatches to record of dye pigments	6
43	Select colour swatches	1
44	Measure dye pigments based on silk fibre quantity	4
45	Add dyes to silk fibres	18
46	Steam silk fibre	120
47	Dry silk fibres	24
48	Chop silk fibres	6
49	Check for dryness	1
50	Store separate colours in airtight container	1
51	Select textiles according to design	3
52	Insert inclusions into voids according to design	120
53	Insert trapunto token	0.5
54	Check inclusion positioning	2
55	Carry out re-positioning	48
56	Seal void edges	2
57	Photograph completed glass canvas	0.5
		460.5

	Framing Processes	
58	Decide on background colour/material	0.5
59	Decide on inner mount profile	0.5
60	Decide on outer mount profile	0.5
61	Decide on restraining frame profile	0.5
62	Construct measuring tool	8
63	Measure glass canvas	0.5
64	Mitre cut inner frame	1
65	Glue and underpin inner frame	1
66	Check for fit with glass canvas	0.5
67	Remove inner edge of rebate where necessary	2
68	Measure outside height and width of inner frame	0.5
69	Mitre cut outer frame	1
70	Glue and underpin outer frame	2
71	Check for fit with inner frame	0.5
72	Measure restraining frame	0.5
73	Mitre cut restraining frame	1
74	Glue and underpin restraining frame	2
75	Check for fit with glass canvas and inner frame	0.5
76	Cut and Apply background	0.5
77	Colour match inner and outer frame	0.5
78	Apply finish to inner frame (2 coats)	3
79	Apply finish to outer frame (2 coats)	3
80	Secure restraining frame to inner frame	2
81	Assemble glass canvas within the frame assembly	2
82	Insert suspension material	1
83	Assemble background	0.5
84	Take measurements for restraining backboard	0.5
85	Cut restraining back board	1
86	Assemble restraining backboard	2
87	Seal complete assembly	2
88	Add heavy duty hangers	1
89	Secure outer frame to assembly	1
90	Hang in gallery	2
		45



Segment	Purpose	Ramp °C	Temp °C	Hold (min)	Time (hrs)	Comments
1	Controlled Heating 1	240	250	60	1.53	
1a	Controlled Heating 2	400	550	60	3.53	
2	Rapid Heating	300	800	40	4.53	Increase Hold to 40 mins to flatten top surface
3	Unreg Anneal	999	510	60	6.10	
4	Stress Anneal	33	480	480	15.04	
5	Unreg Anneal	30	60	0	29.04	

Appendix 31

Experiments 13-18 Matrix Positions and Colour Theory

Matrix	Description	Experiment
1	Light/Dark Contrast (Void Form and Inclusion Type)	16
1	Saturation Contrast (Void Form and Inclusion Type)	13:16
2	Light/Dark Contrast (Void Form and Inclusion Size)	14
2	Contrast of Extension (Void Form and Inclusion Size)	17
4	Colour Harmony (Void Form and Inclusion Type)	13:16:17
5	Simultaneous Pattern (Void Form and Inclusion Size)	16
6	Colour Direction (Void Form and Inclusion Manipulation)	13:14:15:16:17
6	Colour and Line (Void Form and Inclusion Manipulation)	18
7	Transparency and Colour (Void Form and Inclusion Type)	13:14:15:16
7	Reflection and Colour (Void Form and Inclusion Type)	17:18
8	Optical Colour Mixing (Void Form and Inclusion Size)	13:16
9	Reflection and Colour (Void Form and Inclusion Manipulation)	16
12	Light/Dark Contrast (Void Spacing and Inclusion Manipulation)	15
13	Colour Harmony (Void Spacing and Inclusion Type)	16
15	Colour Direction (Void Spacing and Inclusion Manipulation)	16
16	Transparency and Colour (Void Spacing and Inclusion Type)	14:16
16	Reflection and Colour (Void Spacing and Inclusion Type)	15
17	Optical Colour Mixing (Void Spacing and Inclusion Size)	18
18	Reflection and Colour (Void Spacing and Inclusion Manipulation)	16
19	Contrast of Hue (Void Layering and Inclusion Type)	13
19	Light/Dark Contrast (Void Layering and Inclusion Type)	13:17
19	Cold/Warm Contrast (Void Layering and Inclusion Type)	13:14:18
19	Saturation Contrast (Void Layering and Inclusion Type)	14
22	Colour Harmony (Void Layering and Inclusion Type)	16
24	Colour Direction (Void Layering and Inclusion Manipulation)	16
25	Transparency and Colour (Void Layering and Inclusion Type)	16:18
27	Reflection and Colour (Void Layering and Inclusion Manipulation)	16

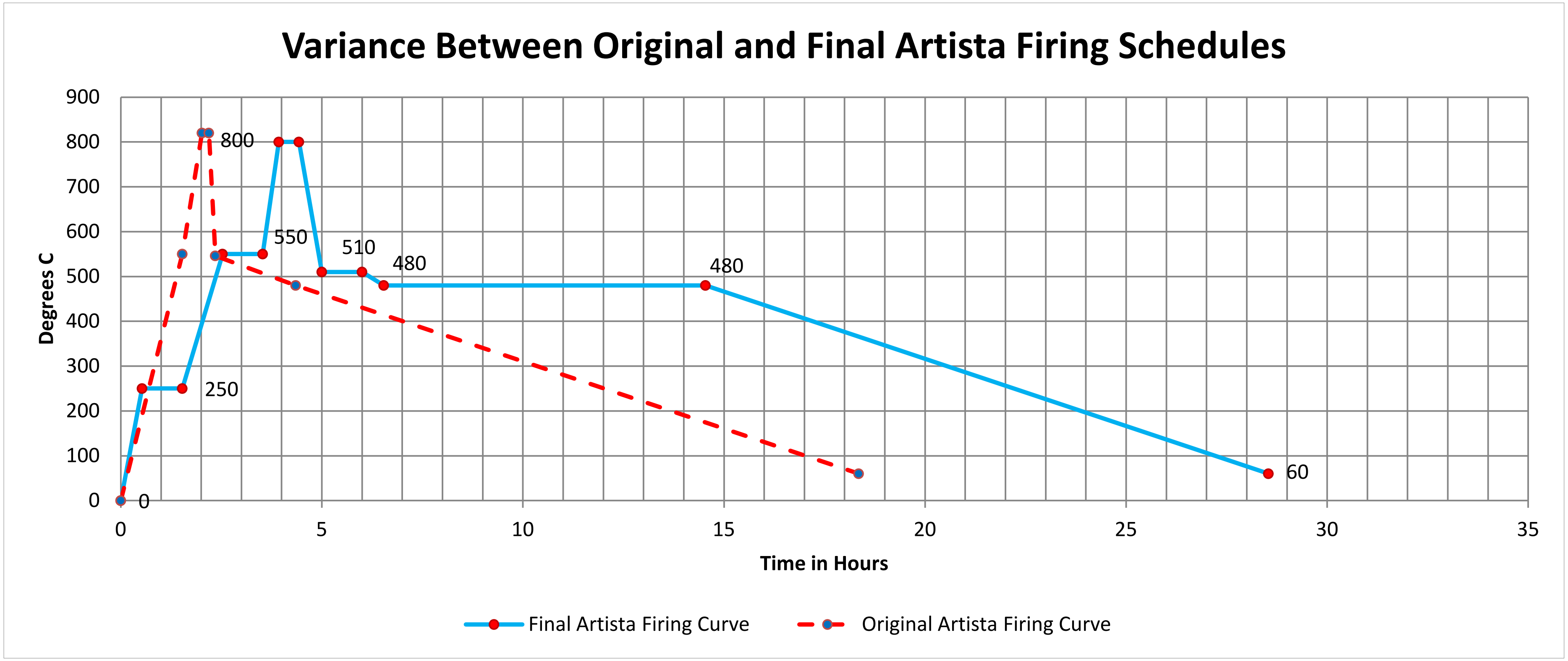
Experiments 1-18 Technical Principles

#	Description	Exp #	Exp 13 - 18
1	Optimal Top Process Temperature for small sized glass with a surface area between 750cm² and 2000cm²) must be less than 820°C.	1	
2	Holding times need to be added to segments 1 and 1a to allow the gases to escape from the layers within the glass.	1	13:14:15:16:17:18
3	Holding times need to be added to segments 3 and 4 to allow for even distribution of heat within the glass.	1	13:14:15:16:17:18
4	Overlapping lower void strips with upper void strips by at least 50% causes the core material to slip during the firing process, altering the reflection angle of the surface of the void form, which decreases the colour intensity if the artwork is illuminated from above.	1	
5	The optimum maximum process temperature in segment 2 is 800°C to prevent overheating of void edges and closing of the voids.	2	13:14:15:16:17:18
6	Figurative void shapes slumped in the base layer should be left transparent	2	
7	The greater the void space the greater the glass mass which, if greater than 9mm will seek to find its own level at 6mm and cause bulging beyond the boundary size of the glass.	2	13:14:15:16:17:18
8	Larger widths of glass require an extension of the stress annealing hold time in segment 4 of the firing schedule.	3	13:14:15:16:17:18
9	Overlapping lower void strips with upper void strips by at least 50% causes the core material to slip during the firing process, altering the reflection angle of the surface of the void form, which increases the colour intensity if the artwork is illuminated from the side.	3	16:
10	The top void layer can be positioned internal, external or overlapping the perimeter of the lower void layer. Top layer void form can meander across more than one lower void form or it could be contained within its perimeter and bisected.	3	13:14:15:16:17

#	Description	Exp #	Exp 13-18
11	The inclusion of coloured glass (D5640) which has a different specification to clear glass (D0189) does not affect the firing schedule.	5	
12	Coloured glass base increases the optical mixing of similar colour schemes in the upper void layer.	5	15:
13	The inclusion of coloured glass (D4068) which has a different specification to clear glass (D0189) does not affect the firing schedule.	6	
14	Only small amounts of transparent coloured glass are required to have a significant impact on the aesthetics of the final artwork.	6	15:
15	Optical Mixing due to colour spread does not occur when the transparent coloured glass is located base layer.	6	15:
16	Optical Mixing due to colour spread does occur when the transparent coloured glass is located in the second or third layer.	6	
17	The use of straight edged opaque glass pieces should be avoided unless discord is a requirement of the artwork.	7	
18	The use of a single layer complete voided form enhances the planes within the artwork.	7	
19	Coloured frit placed on top of clear glass can be combined with a single void layer and fused using firing schedule Appendix 4.9	8	
20	Coloured frit intensity creates a significant imbalance with void inclusion types	8	
21	Clear glass boarders create difficulty if the artwork is to be framed	8	
22	The thermal insulation of large areas of fibreboard absorbed the heat from the top elements of the kiln and causes the top layer of glass to overheat and become more viscose. This increased viscosity causes the glass to flow away due to gravity resulting in a very thin top layer of glass.	9	13:14:15:16;17:18
23	The thermal insulation of large areas of fibreboard prevents the heat from getting to the lower layers of glass preventing the voids to close off properly.	9	13:14:15:16;17:18

#	Description	Exp #	Exp 13-18
24	The angle of the knife blade must always be perpendicular to the fibreboard when cutting otherwise poor internal void edges will result.	10	13:14:15:16:17:18
25	The non void area must be of sufficient size to allow it to fully slump down to the lower void layers.	11	13:14:15:16:17:18
26	Larger void areas up to a maximum of 75 cm^2 can be produced successfully using the firing schedule Appendix 4.9.	12	14:15:17:18
27	Any inclusion type such could be inserted into the glass voids provided it does not exceed 4 mm in depth and fits within the void width.	12	14:15:17:18
28	Amending the hold time in segment 2 to 40 minutes will flatten the top surface layer of the glass.	13	
29	The firing schedule detailed in Appendix 5.2 is satisfactory for a glass size with a surface area of 2128cm^2.	13	
30	Larger void areas can be placed in the lower void layer ensuring that two layers of glass thickness are fused over the void form	14	15:17:18
31	For large sized glass stage 3 of the firing schedule (unregulated annealing) needs to be reduced from 546º C to 510º C to ensure heat loss.	14	15:16:17:18
32	For large sized glass stage 4 of the firing schedule (stress annealing) hold time needs to be extended from 60 minutes to 480 minutes to ensure heat loss.	14	15:16:17:18
33	All glass when fired should be checked for stress points with a stressometer for safety reasons.	14	15:16:17:18
34	The inclusion of coloured glass (D5332) which has a different specification to clear glass (D0189) does not affect the firing schedule.	15	
35	When a transparent layer of glass is placed on top it adds more possible light paths to the inclusions depending on the distribution of light from the illumination source and the void shape. This will enhance the amount of light reflected in a particular direction and change the appearance.	16	17:18

#	Description	Exp #	Exp 13-18
36	Figuration can be provided directly by the void formation.	17	18
37	The placement of fibreboard so that the upper layer does not overlap with the lower layer results in a relatively flat piece of glass with perfect edges for butt jointing.	18	


Variance Between Original and Final Artista Firing Schedules
Degrees C
900
800
700
600
500
400
300
200
100
0
0
5
10
15
20
25
30
35
Time in Hours
800
550
510
480
480
250
0
60
Final Artista Firing Curve
Original Artista Firing Curve

Appendix 34

Structure of CD Rom

The CD Rom inside the rear cover shows images of the final outcomes of each experiment in .jpg format. The format allows the display size to be enlarged to show the inclusion detail of each experiment. The structure of the CD Rom is as follows:

E01.jpg	Experiment 1	*Pointe au Sel*, 57cm x 14cm
E02.jpg	Experiment 2	*Jardin des Enfants*, 23cm x 52cm
E03.jpg	Experiment 3	*Virgin Forest*, 24cm x 74cm
E04.jpg	Experiment 4	*Le Jardin du Roi 01*, 24cm x 47cm
E05.jpg	Experiment 5	*Le Jardin du Roi 02*, 25cm x 48cm
E06.jpg	Experiment 6	*Plastic Bag Eco*, 48cm x 25cm
E07.jpg	Experiment 7	*Decaying Leaf*, 36cm x 24cm
E08.jpg	Experiment 8	*Island Fringe*, 38cm x 25cm
E09.jpg	Experiment 9	*Bamboo*, 23cm x 35cm
E10.jpg	Experiment 10	*Coconut Palm Leaf*, 34cm x 23cm
E11.jpg	Experiment 11	*Palm Leaf and Rainforest*, 35cm x 27cm
E12.jpg	Experiment 12	*Banana Plant*, 35cm x 27cm
E13.jpg	Experiment 13	*Caribbean Sunset*, 76cm x 28cm
E14.jpg	Experiment 14	*St Peter District*, 50cm x 75cm
E15.jpg	Experiment 15	*Andromeda Gardens*, 25cm x 100cm
E16.jpg	Experiment 16	*Caribbean Sea*, 50cm x 75cm
E17.jpg	Experiment 17	*Paynes Bay*, 33cm x 75cm
E18.jpg	Experiment 18	*Heliconia Plant*, 48cm x 21cm