

GOLD, GLASS AND THE IMAGE

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ABSTRACT

A background of drawing and long experience of gilding on a variety of surfaces led to a growing interest in, and passion for, decorated glass. Of particular interest was a technique known as *Zwischengoldglas*. Known since ancient times, this glass is characterized by the use of unfired (cold) gilding, a practice with which I had long been familiar. The need to protect the delicate gold leaf, intrinsic to the design of ceremonial drinking vessels from the seventeenth century, led to the evolution of complex objects. Engraved gold or silver leaf is incorporated between two glasses that fit precisely together and are sealed at the lip. I was interested in how might an understanding of these vessels might inform a body of work made today.

The aim of my research was to explore aspects of *Zwischengoldglas*. It set out to examine the problems raised by the need to protect cold gilding on glass, and the marriage of blown glass and gilded decoration on a variety of forms. A literature search on glass history, drawing and decoration applied to three-dimensional form, was intended to inform and support studio work.

The outcomes of the investigation resulted in the early discovery that even a simple version of double glass, within the parameters of this investigation, would be too demanding of time and resources. An exploration of wider interpretations of double gold glass was carried out. New work was produced as a response to the problems raised by the need to protect cold gilding on glass. The principal areas investigated were: the relationship of the form and texture of glass to decoration; the reflective properties of precious leaf applied to glass and of the glass surface; the use of hot and cold decoration on one object; the layering of glass carrying gilded imagery and the passage of light through those layers. The relationship between drawing on paper and on glass was evaluated in the studio and in the written thesis. Study of the history and analysis of the Grotesque and the Surreal clarified the parallels between the glass forms I made and the nature of the imagery I chose to use.

An evaluation of the work produced looked at the methodology, assessed to what extent the research has achieved its aim and evaluated its position in the wider field.

TABLE OF CONTENTS

Abstract	3
Table of Contents	4
Tables and Illustrations	5
Acknowledgements, Authors Declaration	8
CHAPTER ONE	
1.1 Introduction	9
Background to the research, aims and methodology of the investigation, definition, terminology, gilding techniques and description of <i>Zwischengoldglas</i> .	
1.2 A Short History of Gilding and Painting Behind Glass	14
From 250 BC to Romans and Renaissance, religious painting and mass production. European expansion, Industrial Revolution to the present.	
CHAPTER TWO	
2.1 Tests and Trials	20
Examination of investigations, aims, technical information and outcomes.	
2.2 Techniques and Specifications for Gilding and Painting on Glass	52
Water and oil-gilding, backing up and fusing gold to glass.	
CHAPTER THREE	
3.1 Drawing	60
Shift to less conscious style, stimulus and placement of imagery.	
3.2 Grotesque Imagery	68
Gold combined with glass, affinity with the grotesque.	
3.3 Surrealism	66
Combinations and contradictions	
3.4 The Reflected Image	70
Knowledge and mystery, relationship of viewer to gilded glass.	
3.5 Positioning the Work	72

Anish Kapoor, Grayson Perry, Dana Zámečnicková.

3.6 Conclusions 76

Protecting gilded glass, what was learned, where I have arrived.

CHAPTER FOUR

4.1 Glossary 82

4.2 Principle Early Literature on painting and gilding on glass 80

4.3 Bibliography 84

LIST OF TABLES

CHAPTER TWO

2.2 TECHNIQUES

Table 1 Composition of precious metal leaf 54

Table 2 Paints and their solvents 56

Table 3 Firing temperatures 59

LIST OF ILLUSTRATIONS

CHAPTER ONE

1.1 INTRODUCTION

Figure 1 Mid 18th century painted double glass 13

1.3 A SHORT HISTORY OF GILDING AND PAINTING BEHIND GLASS

Figure 2 *Death of Joseph*, Raimundsreut, Lower Bavaria, Germany 16

Figure 3 Beaker, Germany probably Saxony 18

Figure 4 Goblet, Bohemia c.1720-25 18

Figure 5 Beaker, J.J. Mildner, Austria, c.1790-1800 18

Figure 6 Reverse painted and gilded wall panel, Dave Smith, 2004 19

Figure 7 Reverse painted and gilded tabletop, Frances Binnington 19

CHAPTER TWO

2.1 TESTS AND TRIALS

2.1.1 PAIRED GLASSES FITTED LOOSELY

Figure 8 One glass inside another, attached at top rim 20

Figure 9 Outer vessel cut to allow placement of smaller one 22

Figure 10 Outer glass cut in two places to fit over inner glass 23

Figure 11 Tower constructed from cut, blown glass 24

2.1.2 FIRED GOLD LEAF TESTS

Figures 12-19 A variety of leaf fused to glass 25

2.1.3 MOULD BLOWN BEAKERS WITH DECORATIVE FINISHES

Figures 21-38 Painted and gilded finishes on mould blown glasses 27, 28

2.1.4 TALLER, MOULD BLOWN GLASSES

Figures 39-42 Plain, gilded and back painted tall beakers 31

2.1.5 OVERFLOW AND FREE-BLOWN FORMS

Figures 43-50 Variety mould and free blown forms 33

2.1.6 THE MATERIAL AND TEXTURE OF GLASS

Figures 51-54 Textured glass with sandblasting 35

Figure 55 Reverse gilding 35

Figures 56-59 Gilding and painting on both surfaces of the glass 35

2.1.7 REFLECTIVE PROPERTIES OF LEAF AND GLASS

Figures 60-68 Reflections created by leaf applied to underside of glass 37

2.1.8 FORM AND DECORATION

Figures 69-71 Three examples cut for access, gilded and painted 40

Figures 72-76 Painted, gilded, cut blown bubbles, decorated from underside 40

Figure 77 Silvered on the underside, painted on the top surface 40

Figure 78 A group of painted and gilded forms set in formation on panel 40

Figures 79-80 Vessel forms gilded and painted inside and out 40

2.1.9 COMBINING HOT AND COLD DECORATION

Figures 81-84 Fired and unfired decoration, imagery on both surfaces of glass 44

2.1.10 THE LAYERING OF GLASS AND THE CONTROL OF LIGHT

Figure 85 Six cylinders within each other, each with engraved leaf 46

Figure 86 Assembled borosilicate glass tubes with no decoration all	46
Figure 87 The same but with leaf applied to each layer	46
Figure 88 Single cylinder with leaf	46
Figure 89 Each cylinder with leaf applied	46
Figures 90-95 Six cylinders with engraved leaf assembled from 1 to 6	46

2.2 TECHNIQUES AND SPECIFICATIONS FOR GILDING AND PAINTING ON GLASS

Figure 96 Rubbing the gold with pumice powder	55
Figure 97 Backing up with oil paint	57
Figure 98 Engraved gold backed with oil paint	57

CHAPTER THREE

3.1 DRAWING

Figure 99 From a photograph, sketchbook	61
Figure 100 Natural History Museum, sketchbook	61
Figures 101,102 Medical Collection, sketchbook	61
Figure 103 From life, sketchbook	61
Figures 104, 105, 106, 107 Drawings from the Imagination	62
Figures 108, 109 Gilded unengraved glass	63
Figures 110-112 Decoration to fit with form	64

3.5 POSITIONING THE WORK

Figure 113 <i>Cloud Gate</i> , Anish Kapoor	72
Figure 114 <i>Sky Mirror</i> , Anish Kapoor	73
Figure 115 <i>Theatrum Mundi</i> , Dana Záme!níková	74
Figure 116 <i>Golden Ghosts</i> , Grayson Perry	75

PLATES

Plate 1 <i>Blue Globe</i>	48
Plate 2 <i>Rent</i>	49
Plate 3 <i>Humpen</i>	50
Plate 4 <i>Red Form, Renaissance</i>	51

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AUTHOR'S DECLARATION

1. During the period of registered study in which this thesis was prepared the author has not been registered for any other academic award or qualification.
2. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

F. Federer May 2010

CHAPTER ONE

1.1 INTRODUCTION

From the late seventeenth century, as large sheets of silvered glass became a little more affordable, the new style for grand houses required looking glasses to be framed by ornamental gilded and painted glass panels. As part owner of a furniture restoration business, my role as gilder was to restore gilded frames and furniture. When broken, gilded glass panels came to the workshop, I researched traditional glass gilding techniques, which varied from century to century, and began to reproduce them. They might carry intricate strapwork patterns or later, in a more industrial age, a swiftly drawn landscape, produced to formula but a challenge to one unfamiliar with the processes. Learning these new skills was eased by my early education as an illustrator.

Replacing period panels built a thorough understanding of the variety of techniques involved in their production. The knowledge gained was applied in due course to create new work: glass panels for contemporary settings were made for interior designers while I produced my own, individually framed works on glass. A residency at Corning Museum of Glass gave me the opportunity to move from two, to three dimensions, exploring decorated layers of blown glass.

Reverse glass painting and gilding is carried out on the far, or underside of glass. In this way the delicate hold paint and gold have on a smooth, vitreous surface is protected. The work is viewed after completion from the front, through its supporting layer of glass. The result of bonding leaf and paint to glass is a clarity and intensity of colour peculiar to this medium.

The aims of this research were:

- To understand original *Zwischengoldglas*; its construction and the effects of sandwiching gold between close fitting layers of glass.
- By tests and experiment, to widely investigate all variations of the marriage of glass form to decoration.
- To investigate bonding of engraved gold leaf to glass. The quality of the leaf

changes with the application of heat. Tests were made to discover how best to carry out this process. The outer surface of the glass as well as the underside, where possible, was decorated, allowing the building of layers of imagery.

- To investigate the passing of light through layers of unpainted, gilded glass. Multiple layers of glass gradually block light. Investigations examined how decoration is perceived through layers of glass.
- To investigate all the possibilities of protecting engraved gold on glass. To question traditional methods and to record all findings.
- To become aware of others whose work is within my realm, either aesthetically or technically, and to assess where my work fits.

The methodology:

- Explore with blown glass how to fit one object inside another.
- Explore how to decorate those objects and assess their aesthetic value.
- With a set of similar sized beakers, widely explore all possibilities of gilding and painting the glass surface, inside and out. Examine durability and record all findings. Assess the success of the exercise and how well the aims have been achieved.
- Test bonding engraved gold leaf to glass in the furnace and record all temperatures.
- Explore layering not only of glass, but also of decoration on a single glass surface.
- Investigate relationship of form to decoration. Examine all blown glass forms with a view to applying decoration.
- Investigate the use of mirrored glass of varying curvatures and its relationship to the decorated surface of a separate object.
- Search the literature for other makers working with reflective materials and glass and for those who also apply figurative imagery to a three-dimensional surface. Research artists working with imagery, in other media, close to my own. Ascertain how my work would fit in the wider field.
- Investigate the history and philosophy of the Grotesque and Surrealism.

- Studio practice. Drawing in the studio to develop work from the imagination; drawing from the figure and from life. Drawing in museums to build visual memory, study past work as a stimulus for new imagery.
- Make a body of work based on all findings. Reflect on the work and describe how well the aims have been achieved.
- Provide full technical specifications on all work carried out in the course of the research.

Gilding, Burnish and Matt

There are two distinct methods of gilding on glass, burnish and matt. They can be used separately or together. Burnish is shiny and reflective, reflecting shadows and appearing dark; matt scatters the light, does not reflect and appears light. The surface for burnished gilding must be perfectly smooth to achieve total contact with the surface. A water-based glue is used to attach the leaf to the glass. Once dry, the gild is rubbed with soft cotton wool to a high shine and can be engraved by scratching through with a sharpened wooden stylus. An oil-based glue is employed for matt gilding, for which a smooth surface is not necessary. This kind of gilding is not engraved.

Different Substrates

Blown glass is an ideal support for water gilding as it has the smoothness necessary not only for adhesion but also for engraving the leaf. However, despite appearing well attached, the smoothness necessary for success is at the same time its weakness. Lack of tooth, or key, in the surface of the glass is no guarantee of permanence. Without protection of some kind, the decoration remains vulnerable.

Reverse Painting and Gilding on Glass

Dr. Frieder Ryser, a prominent Swiss collector and researcher of reverse glass paintings, exhibited part of his collection in 1992, at Corning Museum of Glass, USA. In the catalogue, he defines the process, employed from the Renaissance to the present,

Broadly speaking, reverse painting on glass may consist of any non-fired decoration that is viewed by reflected light from the opposite side of the object. (Eswarin, 1991, p.10)

He describes techniques in greater detail in *Verzauberte Bilder* (Ryser, 1991, pp. 289-292), his seminal publication. Regarding historical panel glass, he points out:

Antique sheet glass is neither colorless nor absolutely flat. The barely perceptible tint in the glass blends with the bright colors of the applied pigment and the uneven, slightly rippled surface cause the light to break up and glisten. The panel softly reflects the shapes and colors of the surrounding environment, thereby giving the picture its peculiar charm. The special character of a reverse painting is further enhanced by the play of light on its surface.
(ibid. p. 9).

This quote makes it clear that glass is not merely a support but contributes its own qualities to the object.

Terminology

Historically, the different forms of reverse painting and gilding have been given a variety of names:

English Mosaic work

Dutch *Achterglasschildering*

French *Verre églomisé, Fixés sous verre, Peinture sous verre*

German *Hinterglasmalerei, Hinterglasradierung, Zwischengoldglas*

Italian *Pittura su vetro, Fondi d'oro* (Ryser, 1991, p.300)

There has been much discussion regarding the terminology of this process (Eden, 1932, pp. 393-396) with the term, *verre églomisé*, prevailing amongst curators, the press, collectors and students of the art (Honey, 1933, pp.372-381). It is now the commonly agreed term.

W.B. Honey, former Keeper of Ceramics of the Victoria and Albert Museum,

explains the origin of the name:

‘The name is derived from that of one Glomy, an eighteenth century dealer. But the manner in which the name came to be adopted is not generally known.

Glomy was also a picture framer, who introduced a fashion of surrounding a subject with a border of gilding and colour painted behind glass, and prints framed in this way, when the style had been taken up by others, were referred to in the trade as ‘*églomisées*’.’ (ibid.)

Zwischengoldglas

To protect the delicate gilded glass surface, a method was devised of sandwiching and sealing the decoration between two layers of glass (Kunkel, 1679). Producing double gold glass was a highly skilled technique: it was made by grinding and polishing two mould blown glass vessels to fit precisely together. The outer vessel usually had no base. They were often faceted, with narrow, vertical, flat polished planes running from top to bottom. This layer generally remained undecorated. The smooth, un-faceted, *outer* surface of the inner glass carried the gilding and/or painting. Once complete, the larger glass was gently fitted over the smaller and the two sealed with a resinous varnish of some kind. The glasses commonly formed the bowls for wine glasses, or plain beakers, Figure 1. (Brill, 1980, p.20; Rydlová, 2007 pp.103-125)



Figure 1 Double glass, Mid 18th Cent., Corning Museum of Glass, H.10cm.

1.2 A SHORT HISTORY OF GILDING AND PAINTING BEHIND GLASS

The earliest known examples of double glass gilded vessels are from southern Italy¹ and date from about 270-200 BC², the Hellenistic period. Hot and cold techniques were used in their production, but the intricacies of their making could not be sustained beyond this period. The technique of double gold glass disappeared for the next seven centuries, but during that interval gold and glass were combined in a variety of ways.

The Romans developed a unique process whereby two roundels of glass were fused together in a kiln, sandwiching engraved gold (Whitehouse, 2001, p. 239)³. These usually formed the bases of vessels, many of which were, in due course, broken off and embedded in the walls of tombs. In the 9th and 10th centuries, the Syrians revived many early techniques, including sandwich gold glass⁴. An example of fired, engraved gold leaf applied to the outer surface of a blown vessel from Mosul, Iraq dating from 1127-1146⁵, can be seen at the British Museum.

With the construction of the great cathedrals across Western Europe in the early Medieval period, stained glass was widely used to tell stories, as a source of beauty and iconography as well as protection from the elements. In crypts and in areas with no natural light, stained glass was not effective but painted foil, attached to the back of clear glass, viewed from the front through the glass, imitated the effects of stained glass. The reflections from the foil resembled transmitted light through coloured glass (Ryser, 1991, p.36; Eswarin, 1991, p.11). This proved to be a stepping-stone to what was later to become known as, '*verre églomisé*'. The next stage was to attach thin metallic leaf directly onto the glass, engrave it and cover it with oil-based paint.

¹ About 270 and 200 BC. The British Museum, Room 22: Alexander the Great, GR 1871.5-18.2

² Found in a tomb at Canosa, Puglia, southern Italy. The British Museum 000-000-657-297-C

³ Research in this area is being carried out by Daniel T. Howells, AHRC collaborative Doctorial scholarship 2007-2010: *Gold glass in late antiquity*. The British Museum/University of Sussex

⁴ The British Museum, Islamic galleries, 1978 10-112

⁵ *ibid*, 1906 7-19 1

In his handbook of the arts, Cennino Cennini's instructions (Cennini, 1960, pp.112-114) reflect a contemplative attitude to this kind of work, which was probably largely carried out by monks in monasteries,

And I give you this advice, that the day before the day you want to work at this job, you hold your hand to your neck, or in your bosom, so as to get it all unburdened of blood and weariness. (1960, p.113)

The techniques Cennini describes were well established as they had already been in use for over one hundred years. From the Renaissance, cold gilding and painting on glass played an important rôle in the repertoire of the decorative arts in Europe. At first, its use was restricted to the embellishment of portable altars, jewellery, *objets d'art* such as caskets and scent bottles. Two developments encouraged the establishment of painting and gilding on glass as an applied art. In the area of the glass manufactories, glass was often cheaper and more available than paper. Later, with the advent of printing, it became a matter of course to reproduce contemporary paintings as engravings. Their wide dissemination provided templates for repeated use for glass painters. Skilled painters, such as Anna Barbara von Esch (Ryser, 1991, p.177) and Luca Giordano (*ibid.* pp.144-5), produced glass painting as art in its own right.

Religious Paintings and Mass Production

Most central European glass-producing areas were Roman Catholic. Ordinary, devout homes might have had little in the way of ornament, but it was not unusual to have at least one prayer corner with a glass painting. Colour behind glass is unusually intense: its qualities are enhanced by attachment to the substrate and the magnifying properties of glass. Pigment retains its colour as it cannot sink and to some extent its vitreous 'skin' protects it from fading, especially away from direct sunlight. Light passing unevenly through the ripply surface of handmade glass appears to fracture the image.

Candlelight and, later, gas lamps would have added to the mystery of the coming-and-

going effect. With their intense colour and ambiguous definition, these panels lent themselves to contemplation.

The reproduction of paintings on glass became a successful industry. Large-scale production methods became formulaic: outlines of popular engravings were traced onto the glass and the colour filled in, as if painting by numbers. At the height of production in central and Eastern Europe, cottage industries involving every family member, together with glass painting factories, created hundreds of thousands of glass panels annually (Ritz, 1972, p.21). One example illustrates the scale of the business: the villages of Oberammergau, in the Bavarian Tyrol were situated on a direct route from Rome to religious centres in Germany. As protection from wild animals, robbers and pestilence, passing pilgrims bought talismans in the form of hastily painted glass panels of favourite saints. Turnover was high, which led predictably to a loss of quality. Demand fell and the work became a form of folk art for the local tourist trade (Fig.2).



Figure 2 *Death of Joseph*, Raimundsreut, Lower Bavaria, Germany 2nd half 19th century, (Ryser, 1991, p. 281)

The Spread of Techniques

The Thirty Years War, 1618-1648, resulted in a complex picture of broken communities and unemployed glass painters looking for patronage. As a consequence, skills spread. The height of innovative production was centred in pre-war Switzerland

where, in Zürich alone, the city archives registered over twenty glass painters (Jolidon, 1999, pp. 49-71). Hans Jakob Sprüngli (Bretz, 1999, pp. 181-216), about whom more is known than most, was one of several painters who created '*faux*', false, reverse glass painting by attaching a collage of painted parchment to glass and painting and gilding around it. Whether he travelled to find new clients or to learn new techniques, or for a combination of both, he is known to have lived and worked for some time in Naples. Glass painting produced a few years later by at least one Neapolitan artist, Vincenzo Gesualdo, was carried out with the same techniques, indicating sharing of knowledge (Ryser, 1991, p.139). In the 17th century, western missionaries introduced oil painting to the Chinese (Ryser, 1991, p.33), who produced some of the most sensitive glass painting and painted mirrors. A thriving export trade of Chinese painting to the West developed.

In Europe, the forced migration of numbers of highly skilled French Protestant Huguenot artisans benefited London, in particular. Engravers adapted their expertise to decorate glass panels fitted into furniture and pier glasses for the rising class of property owners. The style was popular in Sweden and in France, but probably due to the labour involved, the trend was short lived, lasting from about 1690 to 1705. The development of a new, technically demanding type of double gold glass vessel was then in production in Saxony, in east Germany, as well as in the centre of glass engraving, Bohemia (now the Czech Republic). Augustus the Strong, Elector of Saxony, assembled his extraordinary and massive *Kunstammer*⁶, or cabinets of curiosities in the capital, Dresden. His collections were divided into specialist rooms, dedicated to materials such as gold, silver or porcelain. *Objets d'art*, made from natural materials such as ivory, precious metals and minerals were exhibited in a series of galleries. Little wonder Saxony became particularly well known for double glass drinking vessels simulating agate inlaid with gold, using glass, gold leaf and paint (Fig.3).

Concurrently, Bohemian glass cutting skills adapted to meet demand. Prevailing taste favoured double gold glasses decorated with engraved gold leaf (Fig.4). The techniques necessary for their production, demanded a wide a range of skills and

⁶ www.kunstammer.com

survived for around fifty years⁷. Glassmakers in Austria and Germany produced glasses with inset-gilded medallions into the Biedermeier era, the early part of the nineteenth century (Fig.5). (Drahotová, 1983, p.140). The style, by its opulence and high cost of materials and labour, reflected the tastes and standards of the prosperous industrialists anxious to display evidence of their wealth (ibid., p.169).



Figure 3 Beaker, Germany probably Saxony, 1720-30, Victoria and Albert Museum, 8957

Figure 4 Goblet, Bohemia c.1720-25, (Drahotová, 1983 p.150)

Figure 5 Beaker, J.J. Mildner, Austria, c.1790-1800, (ibid. p.169)

Boom and Bust, the Nineteenth and Twentieth Centuries

As mirrors, generally known as looking glasses, became cheaper to produce they became more widely available, which led to the widespread production of ornate overmantels. These might include decorative glass panels and were designed to be set over the mantelpieces of the rising middle classes of Europe and the New World. Within a few years, the skilled labour necessary for their production proved too costly and the painted glass panels were replaced with wooden panels supporting

⁷ Ph. Dr. Jarmila Broová, CSc. of the UPM, Museum of Decorative Arts, Prague, is expected to publish her research on *Zwischengoldglas* in the near future (at the time of writing, August 2008). She has dated all the glass by taking careful measurements of every element of the glasses. They changed according to period. Information from interview with (Dr.) Jan Schöttner - UPM Prague, 2008

gilded relief plaster and composition.

A lull in the popularity of painted and gilded glass was followed in the early years of the twentieth century by a new awareness of its commercial potential. In the United States a regeneration of gilded glass, principally for elaborate sign writing, reflected the tastes of an increasingly prosperous society. 'Schlag', imitation gold leaf, was often preferred over genuine gold for economic reasons. At the height of their popularity fairgrounds, the breweries and railways all utilized glass for decoration and advertising purposes, an extravagance brought to an end by Prohibition in the 1920s and the Depression that followed.

The art of painting and gilding on glass survives, though in different forms. Gilded advertising signage continues to be popular in the U.S.⁸ and in Britain, Eric Cooper of London and Dave Smith of Torquay are examples of practitioners of fine lettering on glass (Fig.6). A number of interior designers use gilded glass panels for walls and furniture made by specialist producers in decorative schemes for their wealthier clients, with motifs ranging from simple precious leaf laid in a grid pattern to complex gilding and painting (Fig.7).

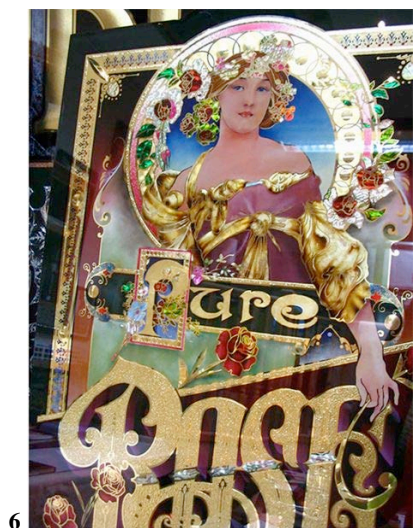


Figure 6 Reverse painted and gilded wall panel, H180 x W90.

Maker/ photographer, Dave Smith, 2004

Figure 7 Reverse painted and gilded tabletop.

Maker/ photographer, Frances Binnington, 2003

⁸ www.theletterheads.com/index.html

CHAPTER TWO

2.1 TESTS AND TRIALS

The central question in this research asks: are there alternative methods of protecting water gilding on glass other than traditional double gold glass? These investigations are intended to build on *Zwischengoldglas*, to find different solutions to this problem and to further develop the marriage of glass, gold and the image⁹.

2.1.1 PAIRED GLASSES, FITTED LOOSELY

Aims of Group 2.1.1, Figures 8-11

To explore ways of using blown glass to make gilded forms to fit within one other. I wanted to explore gilded, off-centred forms where the gilding would be protected by a second layer of glass, or by the glass itself. None of the pieces was expected to stand alone as autonomous works.



Figure 8 One glass hangs inside a larger one, attached at top rim

⁹ Sizes are in centimetres. All the glass is free blown.

Techniques, Methods and Materials

The forms were blown in collaboration with a skilled glass blower. Both glasses, from top: 22ct. gold, 18ct. lemon, 9ct. white gold, caplain. Inside glass, gilded on outer surface; clear oil-based varnish. Inside, oil-based paint, black shellac. Outer glass, gilded inside. No coating over gilding, but a little painting at base of vessel, inside. H20 x Ø13. One open blown vessel hanging inside another, each gilded. The inner glass, gilded on outer surface; outer glass, gilded on inner surface. Imagery chosen: as this was a test, I decided to repeat a pattern on each glass, to create an echo and to display the differences in leaf alloys without the distraction of representative imagery.

Results

Without the time to learn new techniques in order to make close fitting double gold glass, the compromises reached resulted in an object that suggested the original, but lacked its quality. The issues addressed were:

1. Protection of the gilding
 2. Attaching the two objects together
 3. Visual impact
1. The protection of the inner gilding (outer surface of inner glass) is unsatisfactory as dirt can accumulate in the cavity between the two vessels. Without more protective varnish the gold is subject to abrasion. The gilding of the larger glass was varnished to protect the gilding, but this process compromises clarity. Access to the inner surface of the larger glass was difficult, resulting in clumsy handling of the gold.
 2. The two were attached while hot with a bulldog clip, later removed. They were assembled in their hot state and cooled together. The device works as a practical solution but visually is neither elegant nor beautiful.
 3. The impact of the gilding is much reduced by the space between the glasses. The glass forms lack strength and conviction. The object as a whole illustrates what does NOT work.



Figure 9 Outer vessel cut open and reassembled to allow placement of smaller one

Techniques, Methods and Materials

Inner glass form, gilded on outer surface. Outer glass: cut open to allow access for gilding and to allow smaller blown glass to sit inside; varnished and reassembled.

Inner glass, water-gilded 22ct. gold. Outer glass, water-gilded with tarnished silver leaf (silver leaf exposed to the fumes of ammonium hydrosulphide). All gilding on outer surfaces protected with oil-based varnish. H24 x Ø21. Imagery chosen: I intended to emphasise the sweep of the glass by having the decoration run in counter directions. Organic plant forms were chosen, leaving clear glass areas to create ambiguity.

Results

The form is stronger, with signs of a fuller shape developing. Some ambiguity has been introduced with layering of organic forms following the sweep of the glass in counteractive directions. The sizes of the individual glasses in figures 8, 9 and 10 were decided upon through necessity, rather than design. As a result, the voids between vessels 8 and 9 seem indeterminate and unresolved. They lack tension.



Figure 10 Outer glass cut in two places to fit over inner glass

Techniques, Methods and Materials

Inner glass: outer surface water-gilded with tarnished silver leaf. Oil-based varnish overall. Outer glass, water-gilded with 22ct. leaf, engraved and varnished with clear, oil-based varnish. H24 x \varnothing 23. Imagery chosen: Organic plant and animal forms, drawn from the imagination. The forms are placed at random around the glass to create pattern and visual interest. The gilding of the inner glass with tarnished silver leaf creates a more interesting background to engraved gold than solid paint, as its' colour varies, it changes with the light and has its own sense of depth.

Results

With closer proximity of inner and outer layers of glass, this arrives at a more dynamic solution to layering. The form is stronger, but needs further work to appear less like a blown bubble of glass and more like a form that has been carefully considered. This work is the result of the glass failing to fit together. The idea of an inner glass bursting out of an outer shell can be developed, but it was not the intention of this piece. It proved too difficult to blow off-centred glass to fit well together.

See Plate 2, page 49



Figure 11 Tower constructed from cut, blown glass

Techniques, Methods and Materials

Cut, blown glass forms to allow access for water-gilding inside; fitted and assembled to build height. 22ct. and moon gold. Top rim, oil gilded. Prussian blue and black oil-based paint inside. H24 x \varnothing 25. Imagery chosen: Plain rings of gold to emphasise the form of the glass and to retain the simplicity and integrity of concentric circles.

Results

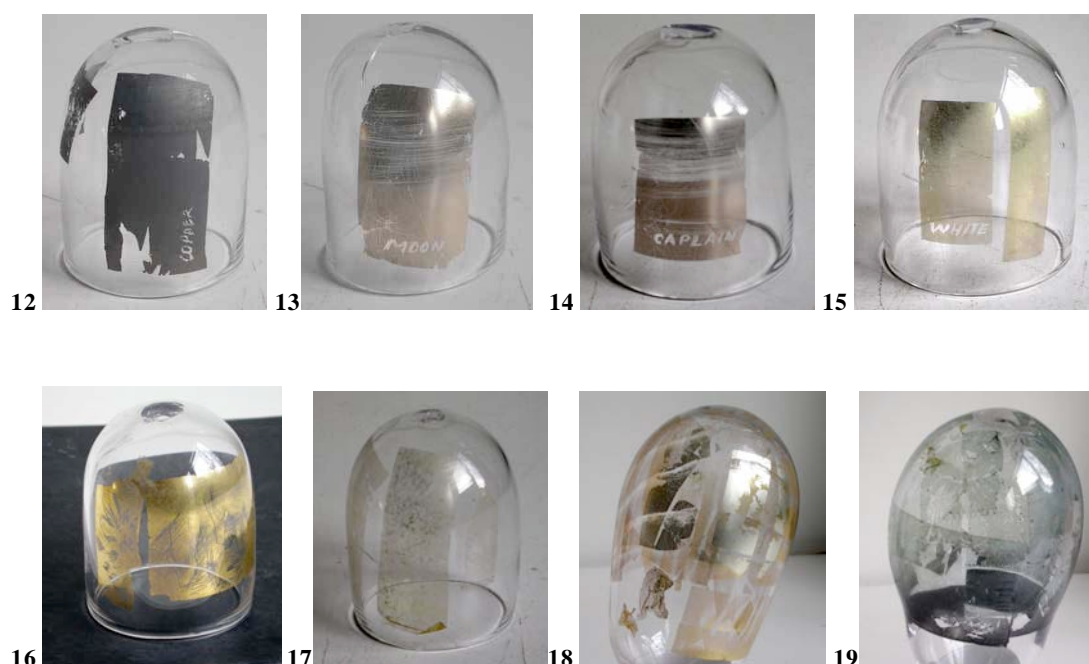
Layering is implied by transparency of glass allowing sight of the sides and back at once. The leaf is well protected. The addition of paint at the base delineates the gold, describing the form of the glass. The work achieved what it set out to do, protecting the gilding with one layer of glass. It stands apart from the others in this group as a complete statement. It has visual interest and its forms are resolved. This idea can be developed in many different directions.

2.1.2 FIRED GOLD LEAF TESTS

Aims of Group 2.1.2, Figures 12-19

To test the effect of fusing engraved leaf to glass to make it permanent without losing its character. The advantages were twofold:

1. Positive results would allow access to external surfaces of glass.
2. Layers of gilding and painting could be built with hot and cold processes, gilding on the inner and outer surfaces of the same glass.



A variety of leaf applied cold and fused to glass in the furnace

Techniques, Methods and Materials

Sizes for 12-17, all H8 x \varnothing 6. Leaf used in the investigation¹⁰

Figure 12 Copper

Figure 13 Moon

Figure 14 Caplain

Figure 15 White

Figure 16 22 carat

¹⁰ Full explanation of the leaf follows in Chapter 2, 2.2, Table 1, page 53.

Figure 17 Lemon

Figure 18 Engraved 22 carat gold and white gold, H20 x ø11

Figure 19 Engraved silver. This glass was blown out while hot. H18 x ø 13.

All the gilding was done with the water gilding method and burnished. Thereafter each glass was slowly heated to 620° C/1150°F in a kiln, and picked up to be introduced to the furnace where the gold was fused to the glass, temperatures around 820° C/1400° F. It was then annealed.

Results

Light passing through engraved gold on clear glass renders it filmy and semi transparent. As a result it is difficult to discern. Once light is blocked with paint, particularly of a dark hue, the gold stands out and can be read. Fused gilding applied to coloured glass reads well for the same reasons. Different metal leaf gives different results. 22 ct gold leaf breaks up and disappears altogether if the glass is blown. White gold and silver look best fused to black glass, which displays their varied colours as the leaf oxidises. Although copper leaf and Dutch metal turned black in these tests, under different conditions they are known to oxidize into exquisite blues and greens¹¹.

The results of heating the gilded glass by the above method for all cases, are as follows:

1. **Copper.** The oxidation caused by its reaction in the extreme heat caused the copper component to form Cu₂O. This resulted in blackening of the leaf. It fused well to the glass but the discoloration is dull and lacks visual interest.
2. **Moon Gold** and **Caplain** scratched while hot but fused well. Scratching is not acceptable.
3. **White, Regular 22ct.,** and **Lemon** did not scratch, but as with all the precious leaf alloys, the leaf lost its reflective properties. The dull, matt surface is

¹¹ Alison McConachie of Edinburgh College of Art is conducting extensive tests with a variety of alloys as well as with silver leaf, fired onto clear and coloured glass. She fires the glass in a kiln, rather than in the furnace, thereby gaining more control over the colours obtainable as they heat and fuse to the glass.

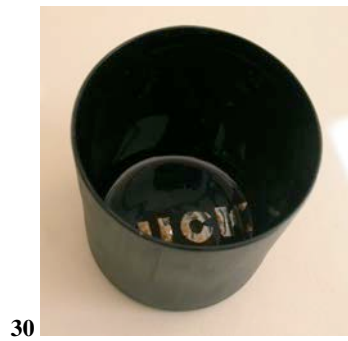
acceptable, providing a contrast to burnished (cold) gilding.

2.1.3 MOULD BLOWN BEAKERS WITH DECORATIVE FINISHES

Aims of Group 2.1.3

To explore the effects of different kinds of decoration on the same form and to compare a variety of methods using precious leaf, glass and paint. The processes included hot and cold gilding.





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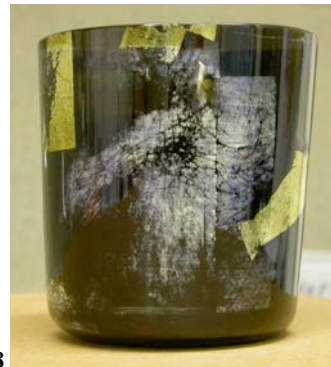
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Techniques, Methods and Materials

The beaker forms, with the exception of fig. 36, were blown into plaster moulds. The processes included cold water-gilding, fired gilding, découpage, gold engraving and cold and fired painting. Traditional as well as non-traditional methods were used. Traditional in this case means methods used regularly since the Renaissance to gild glass, while non-traditional means methods that in all probability have been used in the ancient past, but were not to our knowledge used consistently, and for the purposes of this investigation have been re-invented. Both sides of the glass were employed. Black glass as well as clear glass was used.

The size of each beaker is H8 x Ø7.

Figures 21-38

Figure 21 Outside: water-gilded, engraved, fused, 22ct.

Figure 22 Inside: water-gilded, backed with asphaltum as a resist, excess gold removed by abrasion with dry pumice powder, 22ct. Traditional method.

Figure 23 Inside: water-gilded, oil-based backing paint, silver leaf. Traditional method.

Figure 24 Inside: water-gilded, oil-based backing paint, 22ct. Traditional method.

Figure 25 Inside: gilded, engraved, oil-based backing paint, 22ct. Traditional method.

Figure 26 Inside: gilding, oil-based backing paint, silver leaf. Traditional method.

Figure 27 Inside: gilding, oil-based backing paint, 22ct. Traditional method.

Figure 28 Inside: water-gilded, engraved, découpage with paper and dilute wood glue, oil-based backing paint, 22ct. Traditional method.

Figure 29 Outside, water-gilded, pattern achieved with use of asphaltum resist, later washed away, fused in kiln; inside, oil-based paints, 22ct. Non-traditional method.

Figure 30 Outside, water-gilded, engraved, backed with oil-based paint, white gold. Traditional method.

Figure 31 Outside, water-gilded, engraved, fused in kiln; inside, oil-based paint, 22ct. Non-traditional method.

Figure 32 Lower section, outside, water-gilded, engraved, fused in kiln; top section, water gilding, engraved, inside, oil-based paint, 22ct.gilding. Non-traditional method.

Figure 33 Outside, water-gilded, pattern achieved with use of asphaltum resist, later washed away, fused in kiln; inside water gilded, pattern achieved the same way, oil-based paints, 22ct. Non-traditional method.

Figure 34 Inside, water-gilded, oil-based paint, silver leaf; outside, engraved oil-based paint. Non-traditional method.

Figure 35 Inside, water-gilded, oil-based paint, silver leaf; outside, water-based household paint, scratched through. Non-traditional method.

Figure 36 Commercial glass. Inside, water-gilded, oil-based paint, silver leaf. Outside, oil based paints applied with use of masking tape. Non-traditional method.

Figure 37 Inside, water-gilded, oil-based paint, silver leaf; outside, oil based paints applied with use of masking tape. Non-traditional method.

Figure 38 Black glass; outside, water-gilded, fused in kiln, silver leaf and 22ct. Non-traditional method.

Results

A variety of non-traditional methods, explained above, were found to combine techniques which were developed later for new pieces of work. The restriction of format to a plain beaker proved useful in allowing wide ranging experimentation and to focus on different styles of decoration. The most interesting developments concerned the articulation of the space between layers of decoration and the cast shadows created. The possibilities of building imagery with these techniques, with layers of hot and cold gilding and paint, suggest new possibilities.

Figures 21-29 The tests began in a conservative way using familiar techniques such as reverse gilding and painting.

Figures 30 Unusually, this piece is seen from the inside, but the method is traditional, being gilded and painted on the far side, allowing the layer of glass to protect the decoration.

Figures 31-33 Work on the front of the glass broke with tradition. Fusing the engraved water gilding allows drawing on the near side of the glass, in the positive, not in reverse, on a continuous, curved surface. Colour added to the glass on the far side, that is the back of the glass, clarifies the gilding, enriches the imagery and protects the gilding. These examples combine hot and cold processes, with glass acting as support for decoration and as a 'spacer' between layers of decoration.

Figures 34-37 Oil-based paint is applied to the front of the glass and scratched through. The silvered inner surface of the glass reflects the painted lines but follows the profile of the glass interior.

Figure 38 On black glass it is unnecessary to paint a backing colour for fused leaf.

2.1.4 TALLER, MOULD BLOWN GLASSES

Aims of Group 2.1.4, Figures 39-42

To make two blown glasses from the same mould to fit inside each other.

In such a combination, the outer glass protects the engraved gilding on the outer surface of the inner glass.



Techniques, Methods and Materials

Figure 39 Two mould blown glasses with no cutting or decoration.

Figure 40 Coldworked to remove base and to level both glasses; outer glass gilded and engraved inside; inner glass, gilded and engraved on outer surface. 22ct.

H19 x \varnothing 9.

Figure 41 Coldworked to remove base but no attempt to align the heights of the glasses. Inner glass: gilded and engraved on outer surface on lower 2/3rds of the glass. Top third, gilding in traditional manner on inner surface of glass, where access was possible.

Outer glass: top rim oil-gilded; inner surface, water-gilded at base, where accessible. All the water-gilding is protected with oil-based varnish. The oil-gilding will toughen with time and be less susceptible to abrasion. 22ct. H25 x \varnothing 9.

Figure 42 The inner glass from fig. 41. Colour on inner surface: shellac stained with red dye; oil size, aluminium leaf, oil-based paint. This gives no protection to the gilding, which sits on the outer surface of the glass. H21 x \varnothing 9.

Results

The components were made but it was not possible to control the thickness of the glass. The unevenness of the walls prevented the inner glass sliding down into the outer one. One plaster mould, made by myself, was used by an experienced glass blower. Without extensive preparatory work with several moulds and an expectation of many hours of grinding and polishing, I realised soon this project had little chance of succeeding. Aware of the time this would take, I abandoned any further attempts.

Figure 40 Proximity of the gilding to the protective outer layer of glass is successful, as it reads as one plane, but the imagery is confusing.

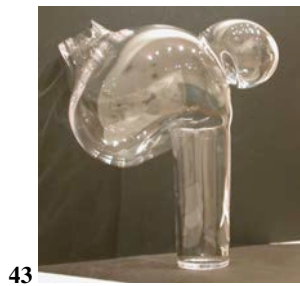
Figure 41 The bolder forms of the imagery make a clearer, less ambiguous statement, but overall the visual effect is confusing.

Figure 42 The inner glass, taken from Fig. 41, undergoes a striking transformation. Backed with strong colour the gold becomes markedly visible and the imagery can clearly be discerned. With a painted background preventing the light from passing through, the glass appears solid and heavy.

2.1.5 OVERFLOW AND FREE-BLOWN FORMS

Aims of Group 2.1.1, Figures 43--50

To explore the use of overflow and free-blown forms and their relationship to leaf decoration. The series developed from mould blown glass where the glass was allowed to flow over the top of the mould. I wanted to explore possibilities of distortion of the hot bubble, then to cut it when cold and apply gilding. I wanted to explore possibilities of organic shapes providing a support for the kind of imagery I was working with.



Techniques, Methods and Materials

The glass was blown, with me present, by an experienced glass blower to my request.

Figure 43 Overflow glass from the top of a long plaster mould. H36 x \varnothing 24

Figure 44 Overflow glass from the top of a short plaster mould. H16 x \varnothing 16

Figure 45 Cut open to allow access. H12 x \varnothing 24.

Figure 46 Glass bubble, compressed and manipulated while hot, cut open.

H20 x \varnothing 15.

Figure 47 The same, water gilded on inner surface, 22ct.

Figure 48 Overblown glass from short mould, cut open for access, water gilded, engraved and lacquered, 22ct. Backed with stained shellac. H20 x \varnothing 23.

Figure 49 Gilding on outer surface, covered with oil based white paint, silver leaf.

Figure 50 Overblown glass from tall moulds, cut open, gilded on outer surfaces oil based black paint, silver leaf. H20 x \varnothing 21, smallest; H36 x \varnothing 24, largest.

Results

Cold cutting resulted in forms that were too powerful for the kind of imagery with which I am engaged. Such supports are better decorated with plain, silvered gilding. This work began to open up new possibilities, but was a diversion from my original aim.

Figures 43-45 Expressive and promising forms.

Figures 46-47 These glasses have moved away from the original brief, exploring the boundaries of manipulating blown glass. The form can take gilding, but practical considerations of access preclude imagery of the type with which I am engaged.

Figure 48 This object is beginning to develop into a satisfactory form. The bubble is pleasing; its cut around the middle to allow access is not distracting. However, the opening at the top is unsatisfactory: it has no purpose and is unsightly. The imagery can be developed in the future to suit the form.

Figures 49-50 These were suitable for silvering, mirroring and echoing the form.

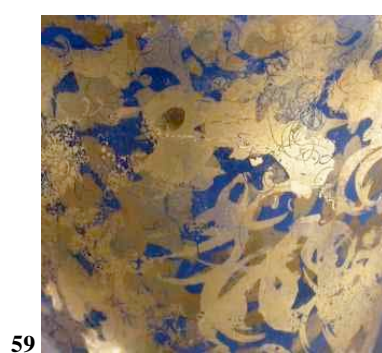
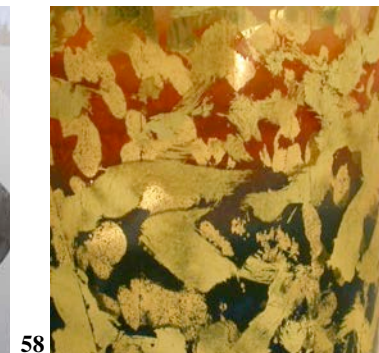
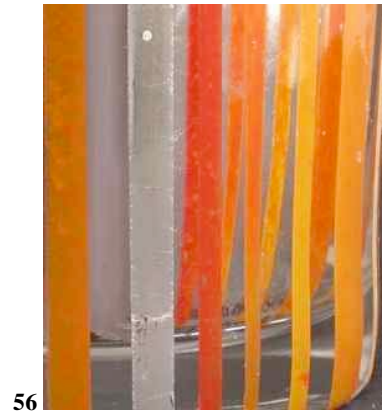
They could be developed to be substantial sculptural forms but I do not consider them to be suitable supports for imagery.

2.1.6 THE MATERIAL AND TEXTURE OF GLASS

Aims of Group 2.1.6, Figures 51-59

I aim to build on aspects of the discoveries made on the small beakers:

1. Rough, smooth and textured surfaces.
2. The passage of light.
3. Comparative thickness of the glass support and the void between layers of decoration.



Techniques, Methods and Materials

Figure 51 Thick glass, fired Tracing Black Best paint to 650 degrees C. H17 x ø 17.

Figure 52 Thick glass with embedded frit, matted with sandblasting on low areas; polished to clear on high points.

Figure 53 Sandblasting with mask, to contrast matt and shiny.

Figure 54 Partial sandblasting, fading from one area to the next. H12 x ø7.

Figure 55 Partial water-gilding, 22ct.

Figure 56 Commercial tumbler. Outside, painted stripes; inside, silver leaf.

Figure 57 Thick glass, outside painted with oil-based, household undercoat paint and scraped away; inside, silver leaf, H14 x ø7.

Figure 58 Thin glass, gilded outside and fused; inside, water-gilded. Oil-based paint.

Figure 59 Thick glass water-gilded outside and fused; inside, water-gilded. Design made with tar-based pigment (asphaltum) resist, later removed. Painted inside with oil-based paint.

Results

Figures 51-54 I discovered how textured surfaces, particularly sandblasted areas, scatter the light. The surface becomes softer and more tactile, but remains shallow. In contrast, as light passes through polished glass, there appears to be infinite depth, with light and shadows confusing any sense of distance. Dividing up the space with patterns of rough and smooth texture highlights the contrasting nature of light absorption. Space is broken up and reorganized. Our apprehension of surface condition and depth becomes confused as inside and outside appear to merge.

Figure 55 With reverse painting and gilding, the viewer is distanced from the decoration on even the thinnest support as the glass itself presents a clear but solid carapace between the gilding and painting and the viewer.

Figures 56-59 The curvature of the inner surface is at variance with the outer. This is reflected in the mirrored surface applied to the inside of the glass. The void between layers of decoration is successfully articulated. Decoration on the outer surface in addition to the inner, breaks up the glossy vitreous barrier and creates a tangible texture. Decorative finishes to both surfaces of glass create ambiguity, posing such

questions as which surface is in front of which, and what is the nature of that void between the layers?

2.1.7 REFLECTIVE PROPERTIES OF LEAF AND GLASS

Aims of Group 2.1.7, Figures 60-68

To analyse the effect of light on, and reflections from, the silvered and gilded surface on a variety of shapes. The group includes surfaces that are cold water-gilded and those that are gilded and fused in the furnace. Some gilding is backed with paint.



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Techniques, Methods and Materials

Figure 60 Two closely fitting beakers. Inside one gilded on outer surface, outer glass gilded on the inner surface. H 19 x \varnothing 9

Figure 61 Detail showing fused gilding on outer surface, cold gilding inside. Cold painting on inner surface. Area pictured: 4 x 4

Figure 62 Reflection in convex silvered glass. Larger dome, H24 x \varnothing 23

Figure 63 Painted thick glass, H18, reflected in concave glass, standing on mirrored surface.

Figure 64 Partially gilded and lacquered blown bubble, reflected in concave silvered dome. Overall H24 x \varnothing 23.

Figure 65 Mould blown tall beaker with overblow of glass. Inside silvered, outside painted with water-based paint. H28 x \varnothing 23.

Figure 66 Reflection of image applied to back side of freestanding section of glass. H23 x \varnothing 10.

Figure 67 Painted and gilded small cylinder reflected in silvered section of a large cylinder. H23 x \varnothing 18.

Figure 68 Small cylinder, decorated on far side and silvered on near side. Imagery can only be seen by its reflection in silvered, large cylinder section. H23 x \varnothing 18.

Results

Light passing through a gilded glass, with no backing paint, can cause visual uncertainty. The viewer looks simultaneously *at* the surface decoration and *through* the glass, to the sides and back where the decoration continues.

Figure 60 Reflected and transmitted light is operating at the same time.

Figure 61 Once backing colour is added, the image is restored to clear legibility but at the cost of depth. Now everything is on a shallow picture plane; there is loss of transparency and sense of 'glassiness' of the substrate. Here, in spite of the reflective quality of the top, burnished water gilded section of the glass, there is neither sense of glass nor volume. It could almost be a painting on canvas. The contrast between burnished and matt gilding can be seen here clearly: the reflective properties of the

gold are lost in the heat of the furnace.

Figure 62 Shows silvered, convex and concave glass at its most mirror-like but fig.

Figure 63, a transparent glass object with applied line drawing reflected into concave mirrored glass, is particularly visually confusing. All sense of form is gone.

Figure 64 Reflecting transparent colour into a mirrored concave form, with gold, explodes into life.

Figure 65 The inside of a blown and cut form shimmers with repeated reflections that constantly move as the viewer moves. Here too, any sense of solid surface has disappeared.

Figure 66 The image is a reflection. The original gilding and painting has been applied to the reverse side of a small glass form, which is placed in front of the curved mirrored glass. It stands in shadow, its reverse side facing us. The result is, we see a reflection of the image but we cannot see the image itself.

Figure 67 A gilded and painted column stands inside a silvered, concave space. The double reflection of the single column creates a visual arrangement; the curve of the mirror's base is repeated in a distorted reflection, describing the space further and uniting the composition.

Figure 68 A cylinder stands within a silvered section of a larger column. The facing side of the column is silvered and the back carries imagery. The reflections allow the viewer to see the imagery, which otherwise would be invisible. The silvered, presenting face of the column is visually ambiguous.

2.1.8 FORM AND DECORATION

Aims of Group 2.1.8, Figures 69-80

To look at the ways in which combining forms with gilded decoration change the way we read the object. To make forms that would not only allow access for gilding and painting on the inner surface but would successfully marry form and imagery. To make objects that would stand on their own as autonomous works.



Techniques, Methods and Materials

Blown glass was chosen above other methods of shaping glass, such as kiln forming, as its surface is perfectly smooth and ready for gilding. It is also a quick and immediate method of making glass forms. The following glass forms were used for this research: free standing 'bubble' forms; a drinking vessel cut for access; half round forms; sculptured forms from sections of the bubble; the traditional vase shaped container; the plain beaker.

Figure 69 H20 x ϕ 20 Blown bubble, cut at halfway point for access to decorate.

Water-gilding with white gold. Oil-based paints.

Figure 70 H20 x ϕ 23 Blown bubble, cut at halfway point for access to decorate.

Outside, fused 22 ct.; inside, on bottom section, 22ct and white gold, oil-based paint.

See plate 1, page 49

Figure 71 H7 x ϕ 15. Blown vessel, cut at intervals to allow access. 22ct water-gilding inside, backed with oil-based paint. See plate 3, page 51.

Figure 72 H13 x ϕ 10 22ct water-gilding inside, backed with oil-based paint.

Figure 73 H13 x ϕ 10 22ct water-gilding inside, backed with oil-based paint.

See plate 4, page 52

Figure 74 H13 x ϕ 10 22ct water-gilding inside, backed with oil-based paint.

Figure 75 H13 x ϕ 10 Lemon gold inside, backed with oil-based paint. Sandblasted base on front, oil-based white paint.

Figure 76 H18 x ϕ 18 22ct water-gilding, oil-based paint.

Figure 77 H10 x ϕ 18 Bubble blown with addition of large frit. Sandblasted overall, highest points polished to clarity. Inside, silver gilding backed with oil-based paint; outside, oil-based paint glazes, wax finish.

Figure 78 H23 x W74 22ct, moon gold, lemon gold, white gold inside, backed with oil-based paint. Mounted on board with cut and shaped sheet lead. Inside, gilded half bubbles glued to forms with silicone.

Figure 79 H7 x ϕ 18. Fired 22ct water-gilding outside, cold water-gilding inside, backed with oil-based paint.

Figure 80 H7 x ϕ 8. Fired 22ct water-gilding outside, cold water-gilding inside, backed with oil-based paint.

Results

Figures 69, 70 the free standing bubbles, aesthetically, were the most pleasing of the objects.

Figures 71, 79, 80 were the most pleasing of the vessels.

Figures 69, 70 are well-balanced forms that invite closer viewing. A story continues to be told as the viewer walks around or turns the object. The bubble is irregular, arousing visual interest and a readiness for the unexpected.

Figures 71, 79, 80 all are familiar, recognizable and potentially useful forms. In fulfilling the criteria of being aesthetically pleasing objects, the gilded decoration in each case is protected in a technically sound and repeatable way. Form and decoration are one with each other. The style of each has considerable potential for development of the form and as a support for imagery. The texture of the glass has potential, too, to contribute to the overall visual qualities of the finished object.

Figures 72-77 are all cut bubbles of glass that retain their integrity as glass forms without further cutting.

The strength of the forms, figs. 72-77, varies. Fig. 73 is the most successful as sculpture. The remainder are weaker in shape than their decoration. Stripped of their ornament they would fail to stand on their own. An accessible canvas for gilding and painting, they do not however, present as strong sculpture, nor as vessel. Fig. 78 works well as an artistic statement: five painted and gilded glass forms held in place with decorative lead, project from a framed panel. Overall pattern on figs. 79 and 80, breaks up the total surface as well as exploring the depth of the glass as support for decoration.

2.1.9 COMBINING HOT AND COLD DECORATION ON ONE OBJECT

Aims of Group 2.1. 9, Figures 81-84

To carry out engraved water gilding on the outer surface of a glass object and to fuse it permanently to the substrate in the furnace. The object is designed to carry additional cold gilding and painting, building the imagery on both surfaces of the glass to layer the decoration and see how the different decorated surfaces interact visually.



Techniques, Methods and Materials

All the gilding was done with the water-gilding method and burnished. As described in Chapter 2.1.2, some glasses were further heated in the furnace to fuse the leaf permanently to the glass.

Figure 81 Blown bubble, cut at halfway point for access to decorate. Outside, water-gilding, engraved, fused in kiln, 22 ct.; Inside: gilded, engraved, oil-based backing paint; bottom section, 22ct and white gold, H20 x ø23

Figure 82 Lower section, outside, water-gilding, engraved, fused in kiln; top section, water gilding, engraved, inside, oil-based paint, 22ct. H7 x ø8

Figure 83 Outside, water-gilding, pattern achieved with use of asphaltum resist, later washed away, fused in kiln; inside water gilded, pattern achieved the same way, oil-based paints, 22ct. H7 x ø8

Figure 84 Outside, water-gilding, pattern achieved with use of asphaltum resist, later washed away, fused in kiln; inside water gilded, pattern achieved the same way, oil-based paints, 22ct. H14 x ø12.

Results

In most cases the gold and glass fused well together. The fired gilding was duller and thinner than unfired gilding, but still visible against a dark backing. Enlarging the gilded object by blowing while in the furnace thins the gold to such a degree that it all but disappears. With no enlargement, however, the imagery achieved in this manner is rich and complex with enormous potential for decoration.

Figures 81-84 All objects work well; the gold is protected and each object stands on its own as a discrete statement. Either single images or overlapped pattern is used to good effect. Depth is described most effectively with overlapping imagery.

Figure 81 The globe invites closer inspection. Clearly leads to more work in this manner.

Figure 82 As an early test, this shows discrete fields of hot and cold gilding and painting.

Figure 83 This, too, has considerable potential to be developed. The space between the gilding contributes to the decoration. The thickness of glass plays an important role in adding depth.

Figure 84 Layers of gilding are separated further with thicker glass.

2.1.10. THE LAYERING OF GLASS CARRYING GILDED IMAGERY AND THE CONTROL OF LIGHT PASSING THROUGH THOSE LAYERS.

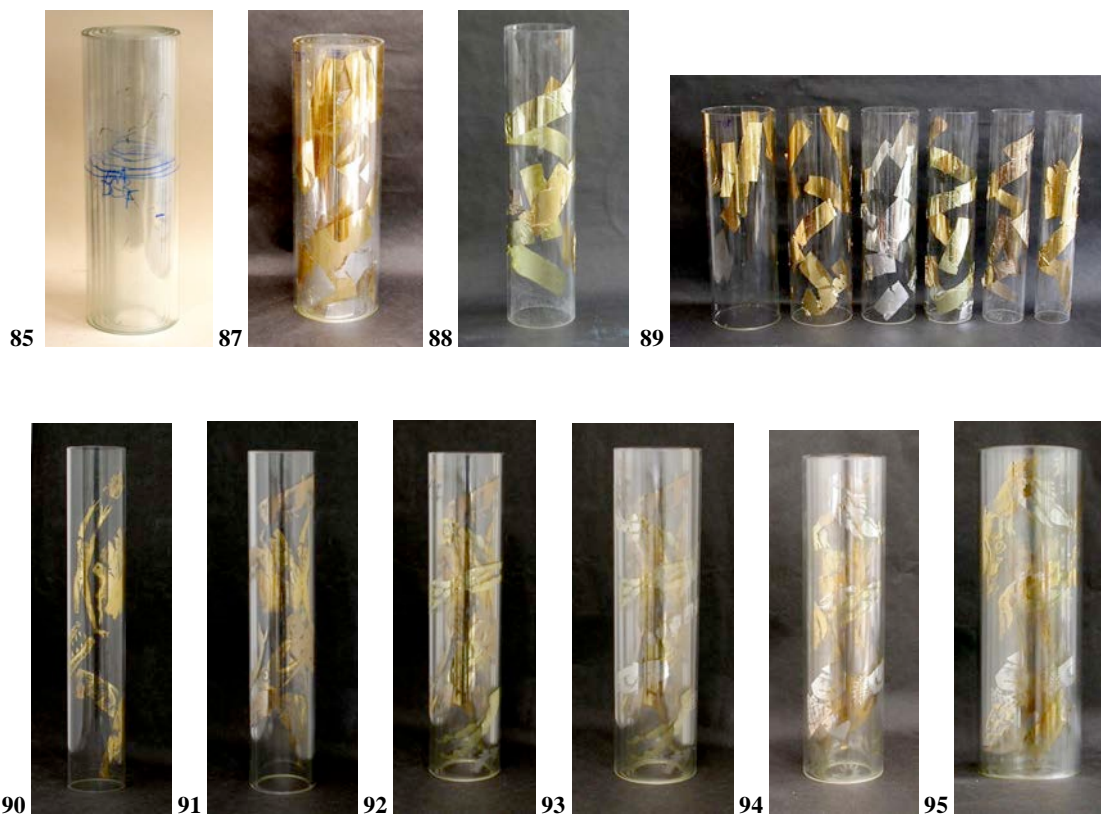


Figure 85 Six cylinders within each other, each with engraved leaf

Aims of 2.1.10, Figures 85-94

To look at the effect of layering using ready-made tubes of boro-silicate glass with decoration. Without the possibility of reproducing double gold glass during this investigation I wanted to explore the visual effect on multi layers of glass.

The original *Zwischengoldglas* had only one layer of decoration; the outer layer of glass served as a protective layer. This series built on this idea, adding complexity by adding space between layers of decorated glass so allowing the action of light to interact with the glass and the gilding.



Techniques, Methods and Materials

The transformation of clear glass into a translucent solid object was investigated through the assembly of multiple layers of partially gilded clear glass. Light was integral to the results, so no back painting was used. Protection to gilding applied to the outer surface of a cylinder is afforded by the next cylinder in size. Final protection is provided by the largest cylinder, which is gilded on the inside at the top only, where access is possible. This last cylinder has no decoration on its exposed surface.

Figure 86 Six clear cylinders standing inside each other. The loss of transparency of multiple layers of clear, undecorated glass is apparent.

Figure 87 Light is blocked and opacity achieved by the assembly of all six gilded, but not engraved, cylinders.

Figure 88 Solid, unengraved leaf is laid on a single cylinder.

Figure 89 Each gilded but not yet engraved cylinder. Once engraved, light can penetrate the surface. From left to right, 22ct., mixed Rouge and 22ct., white gold, lemon and white gold, moon gold, 22ct.

Figure 90 One cylinder, H25.5 x ϕ 34mm

Figure 91 Two cylinders, outer one H25.5 x ϕ 43mm

Figure 92 Three cylinders, outer one H25.5 x ϕ 54mm

Figure 93 Four cylinders, outer one H25.5 x ϕ 61mm

Figure 94 Five cylinders, outer one H25.5 x ϕ 68mm

Figure 95 Six cylinders, outer one H25.5 x ϕ 75mm

Results

The first layer of gilded glass is hard and bright; the imagery is clear. As cylinders are added, the surface becomes more distorted and complex. By the addition of the fourth layer, the hardness of the glass has become soft and vague. Light is reflected and refracted, diminishing its energy as it enters the glass. At each surface, some of the remaining transmitted light is reflected and within each glass layer some is refracted. Each additional, translucent layer of imagery is like a veil, resulting finally in near opacity. As imagery builds, paradoxically, it becomes less accessible through obscuring layers. It invites us and sucks us in. The object has transformed into something soft, deep and porous. The overall effect is inviting and ambiguous. With mechanically made, regular forms, a shift in the conception of the work has occurred. There is no feeling one's way towards a suitable and pleasing form; it is already there. Only the diameter, length and number of layers have to be decided upon based on the observed effects of multi layering. This aspect feels more mechanical in creating visual interest than creating the forms myself, but overall the series successfully demonstrates the possibility of one form inside the other.



Plate 1 *Blue Globe*, H20 x ø23. Photo: Ester Segarra

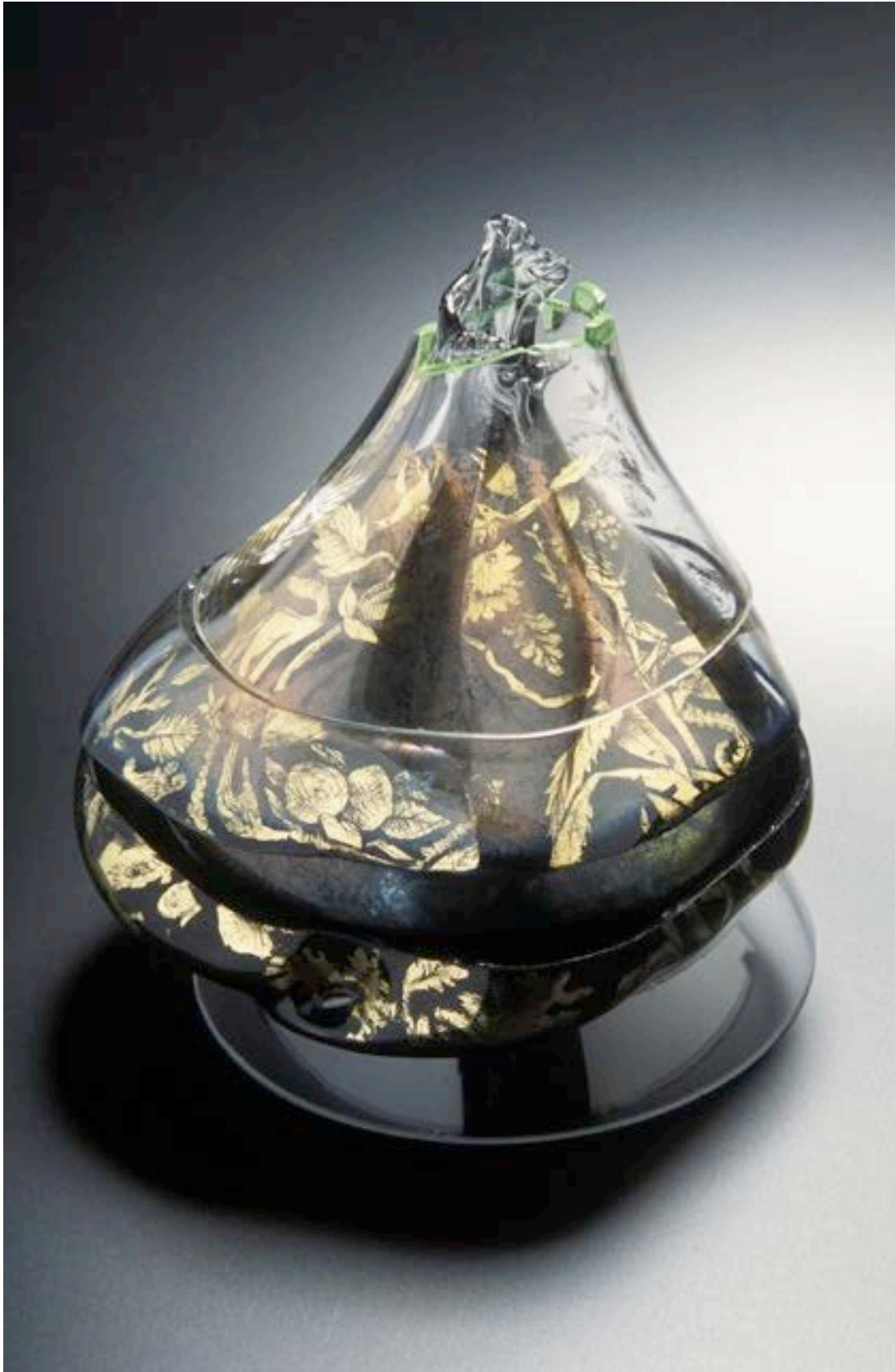


Plate 2 *Rent*, H24 x Ø23. Photo: Ester Segarra



Plate 3 *Humpen*, H15 \varnothing 7. Photo: Ester Segarra



Plate 4 *Red Form, Renaissance*, H10 x Ø13. Photo: Ester Segarra

2.2 TECHNIQUES AND SPECIFICATIONS FOR GILDING AND PAINTING ON GLASS

Gilding refers to water gilding that in most cases is engraved. *Silver gilding* refers, mostly, to silver used as a solid mirror but it too, is engraved sometimes. Most of the gilding in this investigation was carried out on the inner, or far, surface of the glass. Some of it was carried out on the top surface. Where there has been oil gilding it is specifically noted.

A Multiplicity of Methods

Dr. Frieder Ryser (Eswarin, 1992, pp.35-40) identified at least sixteen cold methods of gilding and painting on the back of glass.

Many of them are descriptions of reverse painting, but some apply to the application of leaf and a backing paint. Examples of the techniques he describes are:

- a. First layer, gold leaf or silver. Modelling scratched out. Covering colours lie adjacent to one another for backing. If colours are transparent, foil is used as backing. Second layer of painted backing necessary to fill all gaps and unite the picture.
- b. First layer is a mirror coating. Areas scraped out and reverse painting applied to clear areas.
- c. Painting applied to shiny metal foil. The finished painting, painted in the normal manner with background first, ending with highlights, must be tightly joined to the support by glueing to the glass.

Dr. Ryser's techniques were cold, therefore concerned gilding only the back of glass. As the surface of glass is smooth, there can be no key, or tooth, onto which unfired gilding and painting can hang. Any kind of cold decoration applied to the outer, front surface will inevitably abrade.

'It may be said at the outset that to gild on glass on its front side...is inexcusable bad taste' (Scott Mitchell, 1915, p.77). British sign writers in the early twentieth century saw the practice of lettering on glass as a way of producing visually attractive advertising signs. The only difference in method between fifteenth century techniques

and those of the contemporary shop signwriter is the engraving of the gold, which is not the practice of the signwriting trade.

Gold Leaf

Gold leaf for gilding is reduced from gold bars into extremely thin leaves by a process of beating with hammers. 24 carat gold, which is pure, is very soft and therefore difficult to work with. In order to strengthen it, it is alloyed with other precious metals, such as palladium and copper, reducing the carat. Pure gold will never oxidise, or tarnish. As with paint mixing, precious metals added to the alloy colour the leaf, but the increasing quantity of tarnishing metals, such as copper or silver, will speed up discolouration. An example of an alloy is a leaf called *Rouge*. Produced by the French manufacturer, Dauvet, this alloy of copper and gold and appears reddish and warm in colour. The percentage proportions for *Rouge* are: 95.5% gold, or 22.9 carats, to 4.4% copper.

The term, 'white gold' refers to alloys of pale precious leaf, such as palladium or silver with a small quantity of gold. One of the many white golds available is Dauvet's *Gris*, which appears white and cool, like silver. It has, 40% gold or 9.6 carats, to 60% silver. Without a protective lacquer this leaf will tarnish over time but very much more slowly than pure silver.

In the course of the research I have used a variety of leaf with the glass. *Schlag*, or *Dutch Metal* is imitation gold and, like copper leaf, will tarnish quickly without protection.

Table 1 shows the percentages in the alloys I have used.

	Gold	Silver	Copper	Palladium	Platinum	Zinc
22ct. gold	92%	6%	2%			
Moon gold	91%			5%	2%	
Caplain	79.2%	5.8%		15%		
18ct.lemon gold	75%	25%				
12ct. white gold	49%	51%				
Copper leaf			88%			12%
Dutch metal			85%			15%

Table 1

Precious leaf, the term for all the leaf used in gilding, has different characteristics. For example, the leaf I use the most is 22ct gold, a good standard gold colour that is malleable and works well with a variety of backing paints. *Caplain* is made from an alloy of 3 metals whose particular combination results in a beautiful grey colour. But is difficult to work with, it is floppy and brittle. The alloy that produces *Moon* gold gives it excellent working properties, holding its tension as it is handled.

Water Gilding

In order to scratch or engrave the gold, it is necessary to water gild, the technique using dissolved gelatine in water. As has been mentioned, water gilding is traditionally carried out on the reverse or underside of the glass. When the design is completed, the glass support will protect the work, which is viewed from the other side, the front. Apart from marking out to position the leaf, if necessary, the front will remain untouched. The typical method is to first clean the glass with a proprietary glass cleaner followed by a mix of alcohol (methylated spirits) and whiting (chalk). This paste is left to dry and then dusted away, or the glass rinsed in fresh water. This process should thoroughly degrease the surface ready for applying the size. Size is made from a solution of gelatine and water. Gelatine is obtainable as capsules or as sheet gelatine. If the size is too weak, the gold will not adhere. If too strong, it cannot be engraved.

Method

Size, or glue, is painted onto the glass and the leaf laid onto the wetted surface. The size flows away pulling the leaf down as it does so. As it dries, the leaf makes intimate contact with the smooth glass surface and all wrinkles smooth out. Once it is completely dry, the leaf can be burnished to a high shine with soft cotton wool.

Engraving is a process of scraping or scratching away the gold, using a sharpened wooden stylus, or sharpened ivory or bone. This makes no impact on the glass. As the gold is removed, the glass is exposed. Black paper or cloth, placed beneath the glass, will show through, making lines and scratches clearly visible.

Finally, gentle abrading with the abrasive powder, pumice, on a finger will remove areas of leaf as desired and as texture, fig. 96.



96 Rubbing the gold with pumice powder

Backing Up

Backing up is a term used to describe the use of a protective coat of leaf, paint or varnish, or a combination of all three. It is used to cover and protect the first layer of engraved leaf. A variety of processes are available. Good water gilding is not only stable, adhering well to the glass, but will also be highly reflective. To achieve this the glass must be perfectly clean. Once other processes have begun, the glass becomes contaminated and good results with water gilding are less likely. Further layers of gilding can later be applied to the glass, but they are usually by the oil gilding process, and used in conjunction with paint and/or coloured lacquers. The processes each have different thinning agents: water, turpentine or paint thinners, and methylated spirits. They generally do not mix. Clear shellac can be used as necessary to isolate layers to prevent one layer pulling off the previous one. The principle media are set out below.

Paints and Solvents

Medium		Solvent
Oil	Oil Sign writers/ artists oil paint; asphaltum; back up varnishes; clear acrylic varnish; Poly Urethane, (PU), marine varnish	Mineral spirits, pure turpentine, paint thinner, white spirit
Shellac	Isolating layer, clear or coloured	Methylated spirits/alcohol
Water	Gelatin size, water based paints, water based gold size, pva glue	Water

Table 2

Oil Paint

Once all engraving is complete, the gilded glass can be backed, which usually takes the form of some kind of paint. Without an opaque background the imagery may be hard to see. For solid colour, the paint that adheres the best to glass is oil paint, which is fine pigment ground in oil. A specially formulated paint for signwriters, who apply signs on shop windows, contains less oil and more pigment. This serves two purposes: the paint dries faster and is more opaque, fig. 109. Paint protects the gold as well as colouring it. Its disadvantage is that it can look unsightly from the back. However, the inside of a vessel can be painted to a smooth, even finish. To alter the limited palette of signwriters' colours, any other oil-based paints can be added, with the addition if necessary of glaze or drying agents, such as Japan driers (Mayer, 1982, p. 662). The paint may be applied in thin layers, building depth of colour. Thick paint, while appearing to be effective, does not adhere well to glass and peels away over time. It will eventually crack and separate from the glass support. The advantage of painting behind the gold, apart from the protection it affords, is that the imagery jumps out in vivid clarity, fig. 110.



97

97 Covering, or backing, gold with oil paint



98

98 Gold backed with oil paint

Coloured Lacquer

Lacquer is a shellac-based medium that is thinned with methylated spirits and coloured with soluble stains or dyes. It is applied with a soft brush over the engraved gold followed by oil gilding with aluminium leaf or Dutch metal. Historically, beaten tin was used as backing foil. Typically for the mid-seventeenth century this method imitated the sheen of precious fabrics (Bretz, 1999, pp.194-210). The glowing, reflective qualities of metal leaf behind rich, semi transparent colour has a parallel to light passing through stained glass.

Water-based backing up paint

Generally, signwriters' back-up paint is oil-based. It has been formulated for the glass trade, who demand quick, reliable results. I prefer not to use water-based materials directly on glass as the adhesion is poor. No long-term tests under controlled conditions have come to light so far, but I have tested well-dried oil-based and water-based paints under water. The oil-based paint is extremely hard. To remove it, it needs soaking for several days and then careful scraping with a razor blade. Although water-based paint appears to adhere well to the support, moisture causes it to separate from the glass in a very short time and it peels away like a skin.

Oil /Matt Gilding

Outside work, such as painted iron railings, lettering and stone carving, and fine cast

mouldings on picture frames and furniture, are all gilded by the oil gilding method. Water gilding would not survive dampness and humidity and the techniques do not allow for very fine detailed relief. Oil gilding allows the leaf to be applied to the sized surface when the size, or glue, is almost dry. The finish is usually matt, scattering the light and appearing light in tone. It has no reflective properties. It provides a contrast with burnished gilding, which is reflective and appears dark as it reflects shadows. On glass it is used to 'mat' centres of lettering in sign writing. To avoid unsightly brush marks, size is evenly stippled before laying the leaf.

THE OUTER SURFACE OF THE GLASS

Painting the Glass

With no key, or tooth, to the glass exposed unfired painted glass will eventually separate from the substrate, or support. There are several ways to abrade the surface of the glass to give a tooth, one of the simplest being to lightly sandblast the surface.

Gilding on the Exterior Surface

Gilding, as has been pointed out, will rub off smooth glass. For protection, there are various lacquers available for painting or spraying: cellulose-based, dries so fast it needs to be sprayed; oil-based, takes many hours to dry, collecting dust as it does so, but strong and clear; water-based, dries fast and strong but non-reversible. This last dries with almost no brushstrokes, not so easily achieved on clear glass, but it is not possible to remove with solvents without destroying the gilding.

Fired Gilding

Fired gilding attaches gold to glass by heat, fusing the two together permanently. Cold, engraved gilding is applied as usual to the outer surface of glass but then heated through in the furnace, see *Table 3*. The gold remains intact but much of its gloss is lost in the process. A series of tests were carried out decorating the surface of soda glass. The degree of success depends to a large extent on the type of glass used. Further experiments with different types of glass fall outside the area of this investigation.

Method

The decorated glass object is placed in a cold kiln and heated over several hours with a gradual rise in temperature of around 35°C/ 100°F per hour, over a period of 6/7 hours. At 300-350°C/ 650°F, the temperature can be raised more quickly to 500°C/ 950°F at which point it can be held until required. Just before it is needed, the temperature is raised to 620°C/ 1150°F. The object is removed from the kiln and taken to the furnace on the end of a punty where, with care, it is heated without reshaping. Should it begin to slump, rolling it in the hand, which is well protected by a thick pad of wetted newspaper, will re-shape it.

	Kiln	Furnace	Annealing kiln
Hours	1-6/7	7/8	8-16
Temp	35°C/100°F – 620°C/1150°F	820°C/1200°F	820°C/1200-35°C/100°F

Table 3

Annealing

The temperature is reduced by 22°C/ 50°F per hour until less than 100°C/200°F, at which point the door can be cracked open to let in cold air. It is possible to remove the glass from the annealing oven and start coldwork when it is cool enough to handle.

CHAPTER THREE

3.1 DRAWING

My own background in drawing and training as a gilder led me to the decoration of glass with gold leaf. Analysing the imagery used in the course of this research posed problems for me; following several attempts I was able to reflect on the process and to begin to come to some conclusions. My background is of academic drawing where doodling and free association had been, for me, an activity of the margins. I had not considered the possibility that such 'drawing' could be developed to stand on its own. However, I felt that this freer style of drawing was relevant as part of this research. Once the external framework of an imposed subject, such as in the illustration of a specific text, was removed, the way was open for the deeper contents of the mind to rise to the surface. Similarly, breaking away from drawing from life had an emancipating effect on my drawing. Working in this manner was new and unencumbered. The results had a presence and vitality I had not expected. In contrast to the ordered and controlled form, tapping into what lay below conscious thought through drawing added a further dimension to my work. The emergence of new imagery, by working neither from the model nor consciously from texts, resulted in a closer acquaintance with my own thoughts and feelings; buried thoughts were revealed. I wanted to associate freely (free associate), to work in what the Surrealists term an automative state. In this way, presented with a sheet of paper or the gilded surface, I just drew. As far as I was able, I separated myself from the physical act and allowed other parts of the brain to work, as if doodling while talking on the phone. The process on glass began by randomly gilding a glass vessel blown under my direction and by gilding and engraving it with no intention other than to place imagery well onto the form. Animals and figures appeared, singly or mismatched. Images floated and only overlapped if the reverse side of the glass was also gilded. The drawings grew and evolved independently as I considered shape, pattern and how best to marry imagery with its supporting form. The point of this way of working was that I began to use the gilded glass object as a sketchbook. After many years of learning the craft of gilding I have ignored the rules

and let the imagery happen. Apart from all the years of study and exercise, there has been no premeditation. There is no solid, unchangeable plan and there is no story that is consciously being told. What there is is an easy communication between the gilded glass and myself.

Stimulus for Imagery: Method

For many artists who investigate what lies below the immediate surface of consciousness, the beginning of a drawing can offer a particular challenge. The route is not always direct; a strategy needs to be worked out, a way forward mapped. To begin my process I often use external stimulus. An effective strategy is to start with drawing an object from the natural world, maybe taken from a photograph, (Fig. 99), maybe made in a museum or from life, (Figs. 100-103). I also take stimulus from other artists' work by copying and redrawing it.



Figure 99 Sketchbook drawing from a photograph

Figures 100-102 Sketchbook drawings from museum exhibits

Figure 103 Sketchbook drawing from life

The process of owning the information has begun, but it still has a further journey to make. To take it deeper into my memory I draw it again and again until the imagery has become my own. At that point, forms have begun to be understood and integrated into my own ideas. They can be called upon as needed, to surface from the depths almost without effort. Another approach to creating imagery is to start with random marks on the page. They need not correspond with any known thing, but soon the eye and the brain begin to recognize and to develop forms. Starting on a blank sheet in a rectangular format can be intimidating: how do I fill that space? However, there is restraint in the borders; I am not going to fall off the edge. I can see at a glance the limits of the area I have described for myself. With a vessel or sculpture I cannot see those limits, only the base is a definite edge.



104



105



106



107

Drawings from the Imagination

Figure 104 *Still Life*, 70 x70 cm.

Figure 105 23 x 29 cm.

Figure 106 23 x 29 cm.

Figure 107 80 x 60 cm.

Decorating gilded glass starts with consideration of the form and of how and where gilded ornament will interact with the support. I place the leaf almost, but not quite, randomly. Instead of a large white rectangle to fill, the sections of leaf on the glass, their shapes and their proximity to one another already suggest to me animals, leaves and figures. If I cannot see anything there, I start making marks and see how this develops.



108



109

Figure 108 Gilded, unengraved glass, H25.5 x ϕ 61mm

Figure 109 Gilded, unengraved glass, H24 x ϕ 23

I can see through clear glass to the sides and back, but with leaf and paint I block the light. Images float on the surface of a form, with no restraining borders. Somehow I have to anchor them, to bond them to the surface so they are one. They can be discrete motifs, carefully placed, or the whole surface might be covered like a texture made to measure.



Figures 110-112 Decoration to fit with form, H4 x ø 5

Already the surface is expressing something about form, it undulates with texture and body. The substrate, that is the support for the decoration, is blown glass. The bubble may have been allowed to collapse in the furnace, like a saggy balloon.

Whether I have been gathering information by drawing at a medical or Natural History museum, from life or from photographs, the imagery that is resting in my subconscious will surface. ‘...There is no question that most of the decisive impulses of the artist - and, indeed of the scientist - issue ... from below the level of awareness’ (Arnheim, 1980, p.5). The images are not planned in any structured way apart, as has been said, from the placing of the leaf on the forms I have made. Unplanned conjunctions can develop.

Lines, Blobs and Puddles, (Rawson, 1979, p. 81)

Whereas Picasso, Matisse, even Mondrian and Kandinsky concentrated on abstracting from perceived reality, Klee began with a point, extended it into a line and famously took it for a walk wherever it wished to go. The exact stage at which this abstract construct began to suggest an image was not premeditated. At the early stages of a work, Klee was really interested only in creating a balanced, if complex, composition of abstract marks. (Hartley, 2002)

Regarded as an important part of the Surrealism movement, Klee freed his mind from conscious control, drawing automatically. Recognizing the creative possibilities of random marks, the art historian Philip Rawson writes: ‘... the appearance of the blob intrinsically represents the elements of hazard in drawing technique.’ He says,

...the ... techniques of the Chinese ink painters of the Sung dynasty, and later Chinese and Japanese epochs, cultivated “spilled ink” as a stimulus to invention. Literal “puddles” of ink would be teased with the brush into suggestive shapes. J.R. Cozens’s blot landscapes also began the same way. Jackson Pollock and many other Abstract Expressionists elaborated the use of the blob into a system. (Rawson, 1979, p. 81)

Here the artist is working with what is presented on the page. For the Surrealists imagery, stimulated and conceived by literature, was represented onto the page. They, too, sought to make manifest what was deeply buried in their subconscious. For others, music might be the trigger for the imagination. This was a significant contributing factor in the visual language of Kandinsky who often painted on glass in preparation for his larger canvases. (Düchting, 2001, p.52)

What came out of my drawing has been a combination of strange, bizarre forms, which are a mixture of the surreal and the grotesque¹². Renaissance grotesque ornament is a mixture of fantasy, reality, menace, humour, mystery and magic. Glass gilding dates roughly from the Renaissance and originates from the same geographical area, central Europe. My roots, too, lie in central Europe. My parents are of Jewish extraction and fled Hitler in 1938. I feel an affinity with dream-like, surreal and unlikely combinations that have an undertow of menace. It is the darker side I am interested in bringing to the fore, the sense of uncertainty that strange combinations arouse; the reminder that we can never be sure of what may occur, of who we really are.

¹² The ‘grotesque’ refers to a classical style of decoration derived from the discovery of remnants of murals in Roman underground vaults, or grottoes, hence its name. (Lucie-Smith, 1984, p.95)

3.2 GROTESQUE IMAGERY

Painting and gilding behind glass produces unique effects. The reflective qualities are multi-layered, standing between the known and the unknown, calling into question our perception of the real and the imagined. According to the light and to the angle at which we observe the glass, different aspects are revealed. Resembling a hologram, reflections are separated, fractured; sometimes viewers and their surroundings are reflected in the surface, sometimes the image itself appears to come and go. Some gilding is bright enough to reflect. Shadows are reflected and the surface seems dark. Some gilding scatters the light, reflecting nothing, the surface appearing light. On occasion, the glass itself reflects leaving the image hard to decipher. Burnished gold on glass is animated, never still. Uneven glass further breaks up the light. It is these qualities of movement and change that render it not only unpredictable and mysterious but ensure its abiding interest.

When Geoffrey Galt Harpham says, as we look at the grotesque, ‘we... catch ourselves... .. in the act of perception’, think of viewers examining a gilded glass. They bend down to see better; as they move, so the image moves. They are attracted and fascinated and do not understand how and why the image is coming and going. They observe themselves in the act of perception (Harpham, 2006). For this area of research I have worked with free association, allowing unplanned imagery to surface. The forms that emerged have much in common with the Grotesque. Intrigued by the dark humour of this style, this seemed an ideal form of imagery to combine with the glass surface, to enlarge upon for my research.

E.H. Gombrich identified two dominating human tendencies: our need for a sense of order and our search for meaning (Gombrich, 1979), the grotesque challenges both perceptions. We cannot make sense of these ‘monsters’; there is nothing to hold onto, everything is in flux. The visual confusion is disturbed and this affects our feelings. Harpham explains the phenomenon further:

When we use the word grotesque we record, amongst other things, the sense that

though our attention has been arrested, our understanding is unsatisfied. Grotesqueries both require and defeat definition: they are neither so regular and rhythmical that they settle easily into our categories, nor so unprecedented that we do not recognize them at all. They stand at a margin of consciousness between the known and the unknown, the perceived and the unperceived, calling into question the adequacies of our ways of organizing the world, of dividing the continuum of experience into knowable particles. (Harpham, 2006)

Harpham describes the sense of something illegitimately in something else as producing the grotesque, with antagonistic parts bound together. The grotesque is not fixed nor stable, it is a process, a progression. The gap between systems of understanding can result in the grotesque; time and species have been bridged to form a creature attached to another phase of its own being. The elements of horror and repulsion are combined with the sublime.

3.3 SURREALISM

The unexpected juxtaposition of forms and settings, central to the work of the surrealists, develop aspects of the grotesque. Within the visual arts, surrealists set unplanned marriages of forms in strange environments. A brief survey of their methods and history adds further understanding to my research.

The creative alliance between artists and writers began officially with the first manifesto of October 1924 when its founder, André Breton, declared the movement was, 'psychic automatism in its pure state' (Kaplan, 1997, p.3). As a major figure of the Surrealist movement, Leonora Carrington embodied the marriage of literature and painting. She opens her mock 'artists statement':

'In the early part of the latter nineties I was born under curious circumstances, in an Eneahexagram, Mathematically. The only person present at my birth was our dear and faithful old fox-terrier, Boozy, and an x-ray apparatus for sterilizing cows. My mother was away at the time snaring crayfish which then plagued the upper Andes and wrought misery and devastation among the natives.' (Aberth, 2004, p.149)

The Surrealists were philosophical revolutionaries, interested in juxtaposing objects in unlikely settings. At first the emphasis was on literature, but within a few years the movement was recognised as being led by the visual arts. In his essay on printmaking within the movement, Robert Rainwater writes, 'According to Breton, this method of drawing led to the disclosure of images as a genuine parallel to the use of psychic automatism in writing.' He continues, 'By presenting ordinary subjects in extraordinary settings, the surrealists stretched the imagination and revealed just how blurry the line between the real and the unreal can be.' (Kaplan, 1997, p.12). By the second manifesto of December, 1929, Breton had revised his intentions. He demoted automatism in writing and drawing in favour of '...variations on illusionist, interior landscapes recalled from dreams'. (ibid., p. 23) The Surrealists were exploring the dark unconscious world of desires, despair and sexuality as had been described in

Freud's *The Interpretation of Dreams*, 1932.

Two of today's leading cartoonists are Ralph Steadman and Gerald Scarfe, whose savage and brilliant satire is informed by elements of the surreal and the grotesque. Their work demonstrates how the pervading ideas of surrealism continue to inform diverse aspects of the visual arts. The confusion between reality and fantasy was common to the grotesque and to surrealism, but particular to the grotesque was a conscious invoking of the unknown and fearful, linked to a medieval belief in eternal damnation. Our brains endlessly try to interpret, to dissolve the grotesque and allow understanding of new, unexpected experience. There comes a liberation of knowledge – we see the deformed as sublime. Like paradox, it can herald a new awareness.

Working from a position of less than full consciousness allows 'things' that lie at the bottom to rise and make their appearance. By reducing the filter they are given air to breathe and room to move around. Confusion of energy ensures a conflict of attraction and repulsion. This was the method of work adopted by both the Surrealists and by artists of the grotesque. What can appear is often repellent and intriguing.

Vitruvius drew attention to the way that the human body, with arms outstretched and legs akimbo, could be described within a circle and a square, the two most perfect geometrical figures. (Kemp, 2004)

The perfect sphere of the glass bubble is open to corruption, to mutation into something other. If not actually ugly, the distorted sphere can carry intimations of ugliness; it can suggest the devilish. Perceived through a modern lens, cutting open the glass, violating the closed bubble to decorate and reassemble it can be seen as a grotesque act. The form can certainly, legitimately, be something else where shuffling the pieces produces mysteriously blended images of nature: the depiction of things that never have been, never are and never can be.

The simple glass vessel has been turned into an object whose production is highly complex and secretive. The English clergyman, Charles Caleb Colton, wrote, 'Man is an embodied paradox, a bundle of contradictions' (Colton, 1826). The grotesque excites the senses while inviting a search for meaning. It draws attention to the artistic act of creation, to consider alternative possibilities.

3.4 THE REFLECTED IMAGE

In an historical survey of the mirror in which art, science, literature and philosophy are discussed, Sabine Melchior Bonnet compares the spherical mirror to the mirrored plane, observing that technical advances were influenced by the humanists' new relationship with knowledge.

The convex mirror concentrated space and offered a global and spherical view of the world, embracing many perspectives, but its roundness distorted the image. The plane mirror, on the other hand, offered an exact but only partial image, a framed image from a single point of view that controls what is seen like a stage director' (2002 p. 128).

The science historian, Mark Prendergast, acknowledges the paradox of wanting to delve into the mysteries of life, yet wanting mysteries to remain just that, highlighting the yearning to *know*, while clinging to imagination, illusion and magic. With a highly reflective surface it can be impossible to verify a precise point of view¹³. A curved mirrored surface rearranges perspectives. As you move around it, distorted images are constantly shifting. Affirming the attraction of the illusion, Bonnet quotes the seventeenth-century Jesuit Tesauro, at the beginning of his work, *Cannochiale aristotelica*, '...it is a more curious and agreeable thing to look at several objects in perspective than to see the originals pass before the eye'. Bonnet adds, 'An illusionary version of the original proves more seductive than the original itself, as does variety over sameness.' (ibid, p.129).

A forest of mirrors, or a "desert of mirrors", overwhelmed the twentieth century, constantly reminding men of the lesson forged in the seventeenth century: Man is nothing other than reflection and vanity. But the mirror has been stripped of the mystical significance it once had. "Mute surface," is what Borgès called the mirror - "uninhabitable, impenetrable, where all is event and nothing is memory" (Borgès, 1953, p.121, also "La Rose profonde", in the same book, p.162).

¹³ See for example, Anish Kapoor's mirror sculptures.

As she quotes Borgès, Bonnet makes her point that the ubiquitous, flat, mechanically made mirror is no longer mysterious (2002, p. 268). But what of the confusion and void, the chaos and magic of reflected imagery that can be created with gold and silver leaf on blown glass? Burnished precious leaf on smooth, curved glass functions as mirror; the world is reflected in its irregular surface.

I have attempted in this research to navigate through a world of reflections, reality and unreality, truth and illusion. Viewers may struggle to determine the degree and nature of their own involvement in looking, for in the process the self has been distanced through the reflection seen through layers of glass from the original. This is especially true when the image is seen only by its reflection. Viewing a painting in a gallery, if permitted, we can touch and smell the substance of the dried paint and canvas. This is far from the case with decorated glass. Glazing separates the image from the viewer and can be a crucial part of the creative process. This technique was used by Francis Bacon, who insisted on his paintings being glazed in order to create a distance, to remove viewers at least at one level from the canvas and for them to see themselves as they view the painting (Schmied,1996).

3.5 POSITIONING THE WORK

To set my research within a contemporary context, I looked at the work of three artists who make use of reflection and ambiguity with glass or who use drawn imagery on a three-dimensional object. The work of all these artists has parallels with my own investigation.

Anish Kapoor

Since the 1990's, the Indian-born sculptor has been making oversized sculptures with highly reflective surfaces. The scale and presence of Kapoor's sculptures are monumental, questioning assumptions about the physical world. The mirrored surfaces are animated by reflections from the environment.



Figure 113 *Cloud Gate*, 2004-2006. Chicago, Ill. U.S. 10m x 20m x 13m. Photo, <http://artradarasia.wordpress.com/tag/anish-kapoor>

The surface reflects and distorts the city's skyline. Myriads of warped reflections can be seen on the underside.



Figure 114 *Sky Mirror*, a sculpture commissioned by Nottingham Playhouse in 1995.

Photo, <http://www.nottinghamplayhouse.co.uk/skymirror/frames/flashframe2.html>

Dana Zámečníková

Born in 1945, Zámečníková is a Czech former architect and stage-designer who paints serious, thoughtful imagery on layers of sheet glass, creating work for galleries as well as for installation. Jennifer Hawkins Opie (2004, p.136) quotes Susanne K. Frantz (1998) who discusses her scrubbed, ‘slightly dirty’ large-scale work as being slightly human, in contrast with the symbolism of divine purity that light passing through glass represented in the past. Zámečníková’s large work is confrontational; it does not try to please. She herself says she ‘goes against the glass’ in muddying it. Her interest is in building scenes, within what she calls ‘human space and time’. Zámečníková draws figuratively on glass. She uses glass to build layers with cut, flat sheets and enamels paints. Painting on the glass in the normal manner, as if on a canvas, the painting is fused to the surface by firing in the kiln. If she chooses, she leaves areas of clear glass, which add to the perception of depth.



Figure 115 *Theatrum Mundi*, 1993, Corning, USA. Painted glass, 1100cm x 310cm
Photo, http://www.gallery.cz/gallery/en/Vystava/1999_05/Ramec_V.html

Relationships - individual and general - are the focus of Dana's elaborate constructions of plate glass, paint, pastel, and pencil. Figures of men, women, animals - and combinations thereof - dance, prance, hang, and otherwise float in spatially -rearranged, light-filled spaces of glass.

Tina Oldknow, *Voices of Contemporary Glass*, Courtesy of Corning Museum of Glass.

Grayson Perry

Perry made headlines when, as a potter, he won the Turner prize in 2003. He combines traditional craft forms with drawing, applied to an opaque clay surface and fired. His pots are covered with decorative imagery and pattern, the narrative of his drawing revealing his concerns with difficult personal and social issues. His forms are classic and conventional made from earthy, basic materials; clay and pigment. Any ambiguity in his work is in the content of the drawing.



Figure 116 *Golden Ghosts*, 2001, 50cm x 65cm. Victoria Miro Gallery, London

The work I make has parallels with painted ceramic, but can also be seen as drawing and painting applied to a two or three-dimensional transparent surface, making use of the precious and reflective qualities of the materials I use. It occupies a space between ceramics, painting and traditional gilding crafts.

3.6 CONCLUSIONS

This investigation was concerned primarily with understanding the construction of *Zwischengoldglas* and with further methods of protecting engraved gold leaf applied to glass. I was interested in the development of a language of forms and in exploration of imagery as it is placed on those forms. This led to questions of how, physically, to apply imagery to contemporary forms with traditional materials. Through a new body of work, testing traditional customs, methods were devised to protect engraved gold leaf, applied to the outer surface of the glass as well as the inner. Depending on the results, further imagery would be possible, so permitting layering on a clear, vitreous substrate.

The research set out to explore aspects of *Zwischengoldglas* with no intention of reproduction, but with the expectation of integrating what I learned into a new language of imagery combined with form. The difficulties presented by the need to protect cold glass gilding are reiterated as part of this analysis.

The earliest project, Group 2.1.1, was a group of blown, paired glasses fitted loosely within each other. Each was off centre and random in character, as was the decoration applied to them. With these tests, I had three considerations: the form, the decoration and the protection of that decoration, figs. 8-11. I discovered the process was too random to be successful. Off-centre glass forms cannot easily be made to fit within one another; there would be too much labour required to make this process work. The spaces between decorations were weak and indeterminate; in short, there was little control. I then undertook a series of controlled tests.

Group 2.1.2 addressed the question: if engraved gold leaf can be applied to the outer surface and be made permanent, would there be a need for double gold glass? A series of tests, fusing engraved leaf to glass in the furnace, gave a variety of results. The character of the gold was fainter and duller than cold gilding, but the process worked in principle and could be developed.

Form and decoration were further explored, initially in Groups 2.1.3 and 2.1.4. Since ancient times the decorated vessel has played an essential role in everyday life. The form is comforting in its familiarity and its usefulness is attractive. Unfamiliar treatment of the surface can be accommodated within a well-known context. Many artists today choose to use the vessel form as a metaphor for containment and presentation (Opie 2004, pp.28,112). Despite technical difficulties presented by cold engraved gilding on a vessel, for the reasons stated above, the form of the beaker or vase is still the most satisfying. Confining decoration to a simple vessel form within this research has allowed a wide variety of unexpected, exciting results, Group 2.1.3, figs. 21-38. Comprising mould blown beakers, 8cm. tall x 7cm. in diameter, this group supported a thorough investigation of decorative finishes. The simple form was ideal for charting new territory of decoration, inside and out. Discoveries made on these tests formed the basis of a body of new work.

Group 2.1.4, of taller mould blown glass, from 21-25cm. tall x 9 cm. in diameter, was intended as a version of double glasses made to fit inside one another. It quickly became apparent that the varying thickness of hand blown glass would not work with this technique as it fell outside the remit of this research. The tests were abandoned. Glasses blown for possible fitting were separated and their surfaces treated individually.

Group 2.1.5, figs. 49, 50 comprised several sculptural forms which resulted from allowing hot glass to overflow the moulds to produce balloon-like shapes. The forms were made from moulds made for Groups 2.1.3 and 2.1.4. They were subsequently followed with coldwork. By cutting and opening up the forms, an ambiguity of surface was presented: which side was to be gilded and painted? From which side is the object viewed? The taller glasses resembled hollow organic forms as they rose up and presented their cavities, like carnivorous plants. These objects needed nothing more than silvering, on the outer side, to emphasise their form. The smaller versions were insignificant and weak as sculpture, forms too dominant for imagery. Generally, works of this group were not suitable for the imagery with which I was working. I

chose to return to the original investigation of applying imagery to less assertive glass forms. The investigation continued to develop discoveries made on the beakers, which fall into five further groups, 2.1.6 -2.1.10.

Group 2.1.6 explored the glass as a material substance and the role it played separating decorations residing on both its surfaces. Its thickness affected how light, reflection, depth and space interacted with gilding and painting, figs. 57-59. The density and texture of glass contributed interest and depth to the completed work.

The need to gain access to the inner surface of the glass in order to carry out the cold gilding process had in the past, limited the form of three-dimensional glass. Vessels were made in two parts for a variety of objects, from scent bottles and bowls to beakers and wine glasses, of which the last two were the stimulus for this project. The glasses in Group 2.1.8, figs. 72-77, attempted to solve the problem with a simple, accessible form derived from a section of blown bubble that can easily be accessed through the wide opening of its base. This aspect of the investigation concentrated on the marriage of form to decoration. The glass forms were cut, textured and distorted blown glass bubbles. As glass supports for imagery, suitable forms were beginning to develop.

Cutting and reassembling gained access to the interior of the bubble, Group 2.1.8 figs. 69, 70. The blown glass form, standing on its narrow base, had been used repeatedly in the glass world (Lino Tagliapietra, Anna Dickinson) and was a proven, pleasing shape. As a canvas for reverse gilding and painting, with the possibility of adding further fired gilding and painting to the outer surface, this form had significant potential for development. Visually it was pleasing and lent itself to narrative and depth of imagery. The scar resulting from the horizontal cut could be accommodated and even featured. The form could be a successful solution to the problem of protecting engraved gilding on a variety of blown glass forms.

Group 2.1.9 investigated the combination of hot and cold techniques on one object.

Fired gilding was suitable for areas of glass that cannot be reached. It could be combined with cold gilding, where access was possible. The significance of this development was considerable and a major factor of the research. Decorating both sides of the glass acknowledged the void between layers. That space became significant, introducing a sense of depth.

Layering and the transmission of light through glass were addressed in 2.1.10. Six loose fitting cylinders of the same length but of increasing diameter, stood on end within each other forming a single column. Each carried random areas of unpainted, engraved gilding. This project demonstrated that layers of gilded glass, placed in close proximity but separate from each other, achieve a sense of ambiguous, translucent depth enhanced by the voids between layers.

Drawing

The principle difference between drawing with charcoal on paper and drawing on gilded glass is one of scale. The former is more painterly; ‘mistakes’ and revised thinking contribute to the richness of the whole. The coarseness of charcoal forces a broader approach, less concerned with detail than with composition and form.

Engraving gold leaf with a stylus can all too easily seduce the engraver into an orgy of leaves, feathers and fingernails. To bring the two styles together I attempted to work with the gold on a larger scale, but this was unsuccessful. Rather than try to coarsen what is intrinsically a delicate medium, I realised it should be possible to convey all I want in the content of the imagery. Gold on glass is more limited than the range of tones, textures and colour possible on paper, but together they can contain, ‘... a vitality all the more potent because forced into so narrow a channel.’ (Clark, 1953)

Literature

Reading deepened my understanding of the Grotesque and the Surreal; I appreciated the parallels between the glass I made and the nature of the imagery I chose to use. The use of the grotesque and the surreal in some of the glass forms and in the imagery

throughout the investigation was explored through the writings of Gombrich and Harpham, in particular. I came to understand which part of the drawing was conscious decision, for example the positioning of the leaf on the glass is considered and deliberate, and which part stemmed from the subconscious.

Summing up the Investigations

The most significant discovery made during the course of the research was the application of gilded decoration to both surfaces of the glass. With clear glass between layers of decoration, of whatever thickness, light articulated the space, depth was suggested and complexity built.

With no need to make the glass functional, as with the historic examples, by standing one glass inside another, layers of gilded clear glass also created depth. Visually this was intriguing and invited close viewing. Constructing an assemblage of decorated layered glass was possible with commercial tubing, but creating original forms proved, disappointingly, to be too large an undertaking.

Future work

This will address a variety of forms as supports for imagery:

- Forms based on Humpen
- Vase forms of coloured glass
- Clear beakers
- Blown, cut bubbles

Drawing on paper will continue, working from life and from the imagination. More emphasis in the future will be laid on the content of imagery, using texts for ideas and stimulus.

Evaluation

This investigation has allowed a thorough testing of boundaries. I tested the limits of traditional gilding methods, bringing back long forgotten techniques and applying them to a contemporary sensibility. New glass forms were made as supports, which were strong in their own right, and I discovered how to apply and protect imagery to

glass in ways not hitherto considered possible. The parameters of this investigation supported a growth of confidence in the use of personal, imaginative imagery combined with glass.

CHAPTER FOUR

4.1 GLOSSARY

Alloy A combination of metals, such as copper, platinum, palladium and silver with gold in order to enhance strength and colour. A proportion of gold in an alloy, anything up to twenty-four carat, combined with other metals is referred to as gold. White gold is a general term referring to alloys that appear white, like silver, but include a small amount of gold.

Backing up The covering, protection and colouring of the leaf on glass with oil-based paints or stained shellac followed by foil.

Bitumen Chemically unstable tar-based brown pigment which never dries completely and which becomes darker, more brittle and opaque with age.

Broken colour Paint applied in patchy layers revealing previous applications, usually with thin glazes.

Cold painting Unfired painting on glass, generally with oil-bound pigment.

Cold gilding Leaf glued with a water or oil-based glue onto the surface of the glass, in most cases to the underside. It is usually protected and coloured with layers of paint and/or varnish.

Cracking off The glass is set on a turntable and scored with a glasscutter at the point along which the break is to be made. It is spun at a regular speed and heated with a flame set at the same height. This causes a crack to run from the scored point around the glass, along the heated surface. The glass breaks in a clean line.

Découpage The gluing of painted or printed paper to the inner, or reverse side of glass, to create imagery.

Dutch Metal Imitation gold leaf consisting of copper and zinc. Also known as *Dutch Metal*.

Gelatine An organic, water-based glue, obtainable either as capsules, in sheets or in powdered form. It is obtained from boiled animal tissue.

Gilding The application of a layer of gold to a substrate, e.g. gold leaf onto wood or

glass, or a coating of gold fired onto a base metal, like bronze.

Glaze In painting, a transparent layer of paint applied over another layer, or over a ground of a different colour in order to modify it.

Fired gold Gilding on the outer, exposed surface of the glass that is fused to the glass by heat.

Japan driers Synthetic drying agent containing resinates driers in solution. (Mayer, 1981 p.662)

Japan gold size A quick drying, synthetic amber coloured varnish used for mordant gilding.

Marbling The painted imitation of marble.

Mordant gilding Gilding by the use of an oil-based size onto a non-porous surface. (Mayer, 1981 p.571)

Oil-bound pigment Paint consisting of pigment with drying oils as a binder.

Painterly Relating to, or typical of a painter

Precious leaf Leaf that includes gold, palladium, silver, copper, silver and alloys of same.

Schlag (*German*, beat) Imitation gold leaf consisting of copper and zinc. Also known as *Dutch Metal*.

Stipple Paint applied in small dots or dabs, using the tip of the brush. This achieves an even finish with no brush marks.

Substrate The base material to which gilding or painting is applied, e.g., the glass support.

Tarnished silver leaf Silver leaf exposed to ammonium hydrosulphide to accelerate oxidization, thereby altering the colour of the leaf.

Varnish Resin dissolved in a medium and used either as a protective coating (which can be tinted), or sometimes as a vehicle for pigment, forming paint.

Verre églomisé (*French*, literally *glomyized* glass) Glass decorated cold on the back with gold leaf and a paint or varnish backing.

Sources, *Glossary* from Webster 7th New Collegiate Dictionary; Lucie-Smith, 1984; Mayer, 1981.

4.2 PRINCIPLE EARLY LITERATURE ON THE ART OF PAINTING AND GILDING ON GLASS

10th century Eraclius, *Eraclius de Coloribus et Artibus Romanorum*, referred to by Mrs Merrifield, p.188.

c. 1400 Cennino Cennini, *Il Libro dell Arte*, Florence or Padua.

c. 1600 Hans Jakob Sprüngli, 1559-1637, was the author of a manuscript, signed AH.I.S. Master of Faux and Amalieren. One of many artists working with reverse painting and gilding on glass in Zürich and in Naples at that time, he owes his renown to the large amount of documentation that has survived on his life and work.

1612 Antonio Neri, *L'Arte Vetraria* First printed text on glass¹⁴

1662 Christopher Merrett, 'an improved' edition of Neri.

1679 Johann Kunckel, *Ars Vitraria Experimentalis*, his version of Neri. Born 1630 or 1638- c. 1703, the leading glass technologist of his day. He interpreted Sprüngli, making his recipes more widely available. This included the first description of double glass, made in Saxony, using marbling and gilding. The techniques were later revived in Bohemia.

1849 Mrs. Mary P. Merrifield, *Medieval and Renaissance Treatises on the Arts of Painting*, Original Texts with English Translations.

¹⁴ http://www.ilab.org/db/book1767_STCSB5938.html

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