

'MAN IN A RED HAT'
ST MARY'S CHURCH, FAIRFORD: THE CREATION OF A
REMARKABLE LATE MEDIEVAL GLAZING SCHEME

VOLUME 1 OF 2

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ABSTRACT

St. Mary's Church, Fairford in Gloucestershire houses the remarkable survival of a late medieval glazing scheme contained within the twenty-eight windows. The dearth of documentary evidence relating to the creation of this glazing scheme has resulted in speculative proposals for the dating, patronage and authorship.

This dissertation is written following close observation of the windows between 1986 and 2010 during their period of conservation and restoration by the author and his team at Barley Studio that revealed physical evidence to further our understanding of how this glazing scheme was created.

The dissertation is in two parts, the first covering materials and techniques, looking at ferramenta support structures and their implication on the designs; vidimus and cartoons; glass, its manufacture, source, composition and use of speciality types; glass cutting, abrading and piercing; paint pigment and stain; glass painting techniques and method of application interpreted from discovered sketched outlines; kilns and firing and ending with lead, solder and construction.

The second part covers a speculative proposal that Michel Sittow (c. 1469 – 1525) was the primary designer of the windows c. 1503 – 05, instigated by the discovery of discreet anomalies found within the windows. It covers the discoveries and their interpretation; the life of Michel Sittow, with reference to his training and resulting influences that can be compared with the glazing; other works of art in the media of paintings, Limoges enamel, tapestry and stained glass that have comparisons with Sittow's attributed works; explanations as to why Sittow may have been in London and possible links between the Tames of Fairford and the court of Henry VII.

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Perréal, *Mary Tudor, Princess of England, Queen of France*, ca. 1512. Paris, Musée des Arts Décoratifs. Photo: <http://bjws.blogspot.co.uk/2012/12/women-by-french-artist-jean-perreal-c.html>.

Fig. 171, Fairford sVI light a, detail of the head of St. Peter. Photo: author.

Fig. 172, Joyce, tracing of the Queen of Sheba. London, V&A. Photo: author.

Fairford nV light d. Photo: author.

Fig. 173, Fairford nV light d, details of the inscription found on the headdress. Photo: author.

Fig. 174, Unknown artist, *Elizabeth of York*, ca. 1500. London, National Portrait Gallery. Photo: <http://www.npg.org.uk/collections/search/portrait/mw02068/Elizabeth-of-York?>

Fig. 175, Fairford nX light j, *The Messenger*. Photo: author.

Fig. 176, Sittow, *Man in a Red Hat*, ca. 1512. Detroit, Institute of Arts. Photo: <http://fineartamerica.com/featured/a-young-man-in-a-red-cap-michiel-sittow.html>.

Fig. 177, Sir Thomas Wriothesley, *Deathbed of King Henry VII*, 1509, with detail of Hugh Denys. British Library Add.MS 45131, f.54. Photo: https://en.wikipedia.org/wiki/Hugh_Denys.

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DECLARATION

I declare that the work presented in this thesis, submitted for the degree of MA by Research at the University of York, is my own and has not been submitted for examination at this or any other institution for another award.

INTRODUCTION

The Church of St. Mary, Fairford, Gloucestershire

The author spent over two decades restoring and conserving the unique survival of a late medieval glazing scheme contained within the twenty-eight windows of St Mary's Church, Fairford in Gloucestershire (Fig. 1) dating from the beginning of the 16th century. This dissertation will explore the discoveries not only revealed during isolated works but importantly on a complete set of windows produced within a short period of time. Discoveries made during the work on the windows spurred further investigation which the author hopes will provide a better understanding of their production, the source of the materials used and the techniques of how these materials were transformed into works of art representing masterpieces of late medieval Europe. Their mere survival is difficult to understand when so much religious art was lost during the periods of Reformation and Puritanism. Their survival inspired observers to comment in the 17th century. Richard Corbet (1582-1635), Bishop of Oxford 1628-1632, wrote a poem on the windows' survival, having also seen in the church the defaced memorial brass of Edmond Tame:

'Tell me, you anti saints, why brass
With you is shorter lived than glass?
And why the saints have scap't their falls
Better than from windows than from walles?
 ... Faireford, boast
Thy church hath kept what all have lost;
And is preserved from the bane
Of either warr, or puritane.'¹

The sheer beauty and quality of these windows has drawn attention, admiration and comment from successive generations who have through their care ensured the survival of these works of art. Following a visit to Fairford by the Court painter to Charles I, Sir Anthony van Dyck, he 'often affirmed to the King and others that many of the figures were so exquisitely well done, that they could not be exceeded by the best pencil.'² In the 19th century various scholars proposed that Albert Dürer may have been the designer of the windows, a claim comprehensively dismissed in the outstanding monograph *The*

¹ Kenneth Munn, "Fables and Facts," in *Fairford Parish Church: A Medieval Church and its Stained Glass*, ed. Sarah Brown and Lindsay MacDonald (Stroud: Sutton Publishing, 2007), 71.

² Munn, "Fables and Facts," 75.

Fairford Windows by the Reverend J G Joyce, published in 1872.³ In the 20th century another study was made by Hilary Wayment, who published *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire* in 1984. Wayment, in his quest to identify the designer of the windows, proposed that a master A.M., possibly Adrian Vanden Houte, was responsible.⁴ He also suggested royal patronage citing the inclusion of the Prince of Wales feathers within the tracery sections of the south nave Apostles windows and the inclusion of likenesses of the royal family and court of Henry VII.⁵ These proposals have largely been argued against by current scholars.⁶ However, Wayment certainly made progress in highlighting his observations and generating discussion in his book and subsequent published papers.

Another publication appeared in 1997 written by eight contributors, edited by Sarah Brown and Lindsay MacDonald, *Life, Death and Art: The Medieval Stained Glass of Fairford Parish Church*. A revised paperback edition, *Fairford Parish Church, A Medieval Church and its Stained Glass*, appeared in 2007. This publication provided for the first time a broader picture of the architecture, the art and craft, artistic patronage and the devotional climate at the time the Fairford windows were created.

The dearth of documentary evidence relating to the creation of Fairford's remarkable glazing scheme has prompted academics to produce speculative proposals on the dating, patronage and author of these windows. In the second part of this dissertation I will join this list of people making suggestive proposals without documentary evidence.

However the proposal made is founded on evidence found within the windows, which has led to the suggestion of a new author based on evidence of comparative works, the imagery and portrayals found in the windows, and a dating which corresponds with this research.

This dissertation is written in the hope that those more academically qualified in the field of art history will further the observations of a practitioner and flesh out the preliminary research delivered in this work.

³ James G. Joyce, *The Fairford Windows* (London: The Arundel Society for Promoting the Knowledge of Art, 1872), 119-126.

⁴ Hilary Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire* (London: The Society of Antiquaries of London, 1984), 89.

⁵ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 95.

⁶ Richard Marks, *Stained Glass in England During the Middle Ages* (London: Routledge, 1993), 212.

Throughout this dissertation these windows are referred to following the Corpus Vitrearum Medii Aevi (CVMA) numbering system, an internationally recognised and adopted method. (Fig. 2) Figure 3 shows the ground plan of the church complete with the CVMA window numbers and the original well established historic window numbering which follows the iconographic sequence, while Figure 4 shows the subjects contained within the windows.

PART 1 MATERIALS AND TECHNIQUES

Introduction

In this section of the dissertation I look at how the glazing scheme in the new church of Fairford was created, considering both the techniques and the types of materials available at the time.

The demolition of Fairford's old church in the early 1490s left just the central tower intact. The new church used this tower as a focal point for well laid geometric plans when construction started.⁷ It would have been at the stage of building the walls that the masons started constructing the window openings, and the glaziers and blacksmiths would have become involved.

Stonework and support system

The rebuilding of Fairford church followed a well-conceived and unified plan that coordinated the various building trades to produce a harmonious structure, which displayed a state of the art iconographic programme in stone, wood and glass. The stonemasons would have worked closely with their allied trades from the outset of this construction project. For the construction of window openings they would have collaborated with smiths (the iron workers), who were to produce the structural support required for the glazing. In the glazing accounts for St Stephen's Chapel, in December 1351, the smith, Master Andrew, was paid for 120 soudeletts (the horizontal support bars), that were purchased by weight at 1 ½ pence per pound.⁸

At Fairford the ferramenta (ironwork, set in the masonry of the window, supporting the panels of glass) is of hand-forged wrought iron, consisting of a set of horizontal bars with a central lug opening to house the vertical stanchion bar that extends from the window sill to just short of the apex of the main-light openings. (Fig. 5) Horizontal lug bars for each main light were between one and three quarter to two inches longer than the width of the stone openings. These bars were set into pockets carved in the stone mullions and jambs, set approximately eleven inches apart until they reached the spring line (the position where the straight mullions and jambs meet the tracery shapes).

At this stage in the construction of the window opening the vertical stanchion was slotted down through all the horizontal lug-bar openings. Then a continuous long

⁷ Anna Eavis, "The Church," in *Fairford Parish Church: A Medieval Church and its Stained Glass*, ed. Sarah Brown and Lindsay MacDonald (Stroud: Sutton Publishing, 2007), 31.

⁸ Richard Marks, *Stained Glass in England during the Middle Ages*, 37.

horizontal lug-bar, spanning the full width of the window opening from jamb to jamb, was set in place across the spring line division. The ends of this bar could be bent over at 90°, split down the length and splayed apart to form a fishtail shape, or hammered out to form a flattened spade-shaped end. These ends were used as anchors that could be set down into pre-carved pockets in the jamb, spring-line headstones and dividing mullions that had been grooved to accept the continuous bar. Although the visible parts of the ferramenta appear uniform throughout the windows, these differing methods of producing the anchor ends suggest that at least three smiths were contracted to produce the window ironwork during the period of rebuilding. (Fig. 6)

Once the continuous bars were set in position between the dividing mullions and jambs of the window openings, the gaps between the bars and the stonework edges were plugged, possibly with clay. Molten lead was then poured around the carved pockets to encapsulate the bar within the plugged stone recesses. (Fig. 7) This through-bar technique effectively bridged and tied the window openings together and laid the foundation for the elaborate tracery forms above. It is possible that the ironwork was treated prior to installation by being heated to cherry red and quenched in raw linseed oil, or heated and coated with beeswax, processes known to have been used to deter rusting and provided a blackened finish: “A traditional treatment for wrought iron was to scrape, chip or pickle the surface until all scale and foreign substance was removed. A heavy coat of linseed oil was applied, then the iron was heated and wiped over with emery cloth. Finally a combination of beeswax and boiled linseed oil was rubbed into the surface.”⁹ Alternatively to provide a blackened protective finish, they may have been heated and smeared with pitch, a method described by the Benedictine monk known by the pseudonym Theophilus.¹⁰

The ferramenta system at Fairford is forged to a one-inch square section and the outer face of the lug-bar extensions are decorated with a herringbone design. It seems likely that this additional decoration was provided as these bars are set to the external face of the stained glass, and therefore add to the aesthetic appearance of the exterior architecture. This approach to the decorating of the ferramenta systems seems unique to Fairford. (Fig. 8)

⁹ John and Nicola Ashurst, *Practical Building Conservation: English Heritage Technical Handbook. Volume 4: Metals* (Aldershot: Gower Technical Press, 1988), 31.

¹⁰ Theophilus, *On Divers Arts*, trans. John G. Hawthorne and Cyril Stanley Smith (New York: Dover, 1979), 187.

The positioning of ferramenta at this time and in previous centuries followed no fixed rules, being found set both internally and externally. The windows in the Henry VII Lady Chapel of Westminster Abbey, erected within a decade of Fairford,¹¹ have ferramenta set to the interior.

There also appears to be no set rules regarding the angle at which bars of the ferramenta were set against the glazing. Unlike Fairford (where the flat face of the squared bar abuts the stained glass) in Westminster the bars are set at 45° to the stained glass, so that the corners of the section meet the face of the stained glass. (Fig. 9) At Westminster the advantage of setting the bars to the interior is that they are protected against weathering, but the grid formed by the bars gives an obliterating line across the face of the painted glass when viewed straight on. However, being set at 45°, one could view more of the glass painting when viewed from the sides. At Fairford, where the bars are set externally, the vertical stanchion is set one inch away from the stained glass allowing light to pass through the gap. The external stanchion only forms a shadowed line, rather than the opaque line of an internal bar system.

It appears that differences of opinion prevailed between smiths, masons and glaziers regarding the positioning of the ferramenta, and whether they should be sited inside or out. At Norbury church, Derbyshire the chancel glazing c.1300 – 1310¹² has ferramenta sited inside, but the remaining windows of the church, dating from the latter half of the 15th century, have ferramenta set to the outside, suggesting that a change in views occurred.

Ferramenta contemporary with those at Fairford and the Henry VII Chapel at Westminster Abbey are found at Hampton Court, London. These are of the same design as those found in Westminster Abbey, possibly made by the same smiths, yet have been sited to the outside, rather than internally as found in Westminster Abbey. (Fig. 10)

The ferramenta in the west window of Southwell Minster are similar in size and design as those at Fairford and are also sited to the outside, but differ in the way that a through bar is set half way down the height of the main lights, in addition to the through bar at the spring line.

¹¹ Richard Marks, “The Glazing of Henry VII’s Chapel, Westminster Abbey” in *The Reign of Henry VII: Proceedings of the 1993 Harlaxton Symposium*, ed. Benjamin Thompson (Stamford: Paul Watkins, 1995): 158.

¹² Peter A. Newton, “Schools of Glass Painting in the Midlands 1275-1430,” (PhD thesis, University of York, 1961), 69.

Ferramenta sited to the outside of the windows at King's College, Cambridge are remarkably different from those previously described, having two stanchions per light. These double stanchions also differ from previous examples, as the stanchions are not square in section but are rectangular having the narrowest dimension visibly behind the face of the stained glass. The stained glass designer's frustration of having a vertical stanchion casting a shadow centrally down their compositions must have been appreciated as a compromise appears to have been made. The addition of a second stanchion provided an uninterrupted central compartment to depict the art, and the narrower width of the rectangular bar diminished the shadow impact when viewing the stained glass. This new development was advantageous to the stained glass designer but still gave the architectural appearance of the security stanchions when viewed from the exterior. (Fig. 11)

At Fairford, the south nave aisle windows depicting the Apostles must have been some of the first to be installed, as most of the Apostles' faces have the shadow from the stanchion falling centrally across their faces. Possibly having seen this disruptive effect, the designer adjusted subsequent designs. The two central lights of the east windows of the Lady Chapel sII and Corpus Christi Chapel nIII show how the designer offset his depictions to avoid the impact of the central bar line shadow. Throughout the remaining windows at Fairford other characters depicted have their heads leaning left or right from the centre line to avoid the shadow cast by the stanchion. (Fig. 12)

These systems of ferramenta support, comprising of horizontal lug bars to which the window panels are tied, combined with vertical stanchions are commonly found in the British Isles and were certainly used in the late 13th and early 14th centuries; and perhaps even before. These ferramenta systems were effectively used as a security measure, preventing entry into a church through the windows. Remarkably, for additional security, the ferramenta set within the rectangular window opening of Fairford's vestry (in which the church treasures were stored) contains five horizontal lug bars with six stanchions passing vertically through them. (Fig. 13)

By comparison, the method of glazing support used predominantly throughout continental Europe was the setting in place of rectangular horizontal bars at each stained-glass panel division. These horizontal bars had a series of small protruding lugs along the centre line of the broadest face, and a cover plate which was held in place to sandwich the stained-glass panel divisions, with wedges set into the protruding lugs. (Fig.14)

For many years there was a legend that the Fairford glazing had been captured at sea by John Tame from a vessel bound for Rome and he had the new church built specifically to house it.¹³ This story has been convincingly discounted on stylistic grounds by both Joyce and Wayment.¹⁴ It can also be discounted for technical reasons, for it is evident that the stained glass has been constructed using native methods, where each separate panel stacks on top of the other and is tied to the ferramenta, without cutting down the height of the panels to form a separating gap, whereas in continental European systems, a separating gap is used as protruding lugs require the panel sizes to be reduced in order to be accommodated.

Once the stonework and grid of ferramenta support had been set in place, it formed a transparent backdrop that also defined the physical space an artist had to design their compositions. At this stage it would be reasonable to assume that the masons collaborated with the glaziers, providing them with copies of the tracery shapes geometrically set out on the plaster floors of their drawing rooms.¹⁵ (Figs 15, 16)

It is hard to conceive that glaziers would have taken templates of the shaped openings in-situ, when the master masons had this information to hand. It is possible however that glaziers validated the geometric patterns of these master outlines in-situ, possibly using animal skin or paper glued together to identify and record any differences between the master shapes and the final installed stonework. This would help to ensure that the glazing would be an accurate fit when installed and from the evidence of the Fairford windows the Fairford glaziers were certainly competent at achieving this task.

‘Vidimus’ and Cartoons

Initially, a designer, who was not necessarily the glazier, would draw up a small-scale design incorporating key elements to depict the iconographic subject. This small-scale design was called a Vidimus, a word that derived from Latin but was in common usage in both Flanders and England at this time in the late medieval period.¹⁶ Vidimus meant ‘we have seen’, and the term was used for the designer’s compositions for stained glass, tapestries, panel painting or book engravings.

¹³ Richard Bigland, *An Account of the Parish of Fairford in the County of Gloucester* (London: John Nichols, 1791), 6.

¹⁴ Joyce, *The Fairford Windows*, 119-126; Hilary Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire* (London: The Society of Antiquaries of London, 1984), 5, 85.

¹⁵ John H. Harvey, “The Tracing Floor in York Minster,” *The Friends of York Minster Annual Report* 40 (1968): 9.

¹⁶ Hilary Wayment, “Twenty-Four Vidimuses for Cardinal Wolsey,” *Master Drawings* 23/24, no. 4 (1985/1986): 503.

Stained glass designs depicted on the Vidimus were created on outline drawings that indicated the proportions of the main light openings and tracery heads, in relation to the scale of the separating mullions. Current evidence suggests that the grid of the ferramenta support system, and often details for the tracery shapes, were not produced at the Vidimus stage. This may be due to the Vidimus being prepared by a designer accustomed to working on a blank canvas rather than for windows, where mullions and support bars would divide the image area. It is also possible that at the time of preparing the Vidimus, the architectural shapes of the window opening were not known, as construction works were still in progress.

No Vidimuses or cartoons for the windows of St. Mary's Church, Fairford are known to exist, so we must look to other surviving contemporary examples to understand the process involved at this stage of a window's creation. One example is an early 16th-century Vidimus for a three-light window in the collegiate church of St. Waltrude, in Mons. (Fig. 17)¹⁷ This window of Emperor Maximilian and Philip I of Castile has a scene of the Crucifixion within the central band containing several details that are stylistically similar to the Crucifixion imagery in the east window of Fairford church. The Tau cross with an INRI attached plaque, the figures on horseback with flags fluttering on the ends of spears and the gestures of the figures have remarkable similarities. Unlike many other examples, this Vidimus is highly refined and detailed, obviously drawn by a hand competent in the skills of miniature painting, and could be an indication of the detail supplied on the Vidimuses for Fairford Church.

It may be assumed that the Fairford Vidimus submissions for approval by Edmund Tame, largely resembled a collection held in the Musées Royaux des Beaux-Arts in Brussels. This collection of twenty-four designs was commissioned by Cardinal Wolsey for his Chapel at Hampton Court c.1525-6. The handwriting of James Nicholson, Wolsey's favoured master glazier, has been identified on these drawings by making a direct comparison to his writing in the contracts of the glazing for King's College, Cambridge. However despite this the designs are attributed to the workshop of Erhard Schön.¹⁸

The twenty-four designs for Hampton Court Chapel were drawn on paper with pen in brown ink, with a wash to indicate toned down areas. Some areas have been given a

¹⁷ Joost M.A. Caen, *The Production of Stained Glass in the County of Flanders and the Duchy of Brabant, from the XVth to the XVIIIth Centuries: Materials and Techniques* (Turnhout: Brepols, 2009), 217.

¹⁸ Wayment, "Twenty-Four Vidimuses for Cardinal Wolsey," 510-12.

watercolour wash to indicate the suggested colours of glass to be used. What is noteworthy and interesting amongst the collection is the inclusion of optional designs for the central light depicting the Crucifixion. One version depicts angels collecting the blood of Christ in vessels, whereas in the other version the angels collecting Christ's blood are omitted.¹⁹ (Fig. 18) It is possible that this is evidence that a donor would suggest amendments to the submitted design before the final cartoon was produced and the window was made.

Wayment also suggests that two copies of the Vidimus were produced, with one being for the patron and one for the glazing workshop. The one for the workshop would be a sketchier version, whilst the other was a more worked up design presented to the donor to approve, sign and keep as a record of what was drawn up with the Glazier.²⁰ However it seems more likely that only one version of the design was produced to be presented to and approved by the donor, who would then add comments regarding any amendments they felt necessary. The glazier would then have retained the annotated design as an aid for the completion of the window, before presenting the donor with the amended design on the insertion of the completed window.

The designer of the Fairford windows appears to have drawn inspiration from influences acquired from his apprenticeship, training, travels, other contemporary works and printed sources. It is probable that he amassed his own portfolio of designs, sketches and studies over his career to which he could refer. For example, the York Glazier William Thompson (d.1593) refers to a 'book of portiture' in his will that he bequeaths to either his apprentice or partner; this was presumably such a portfolio of amassed reference material.²¹ It is evident from the existing windows in Fairford church that the *Biblia Pauperum* and the works of Netherlandish painters such as Hans Memling were major influences on the Fairford designer who interpreted and recomposed these in his own style, adhering to the constraints of the architectural openings and the given iconographic brief.²²

Once the Vidimus was completed, the next stage of the process was to produce a full-size drawing of the window opening, now commonly referred to as a cartoon. I suggest

¹⁹ Wayment, "Twenty-Four Vidimuses for Cardinal Wolsey," 504.

²⁰ Wayment, "Twenty-Four Vidimuses for Cardinal Wolsey," 503.

²¹ Marks, *Stained Glass in England during the Middle Ages*, 31.

²² Sarah Brown, "The Windows" in *Fairford Parish Church: A Medieval Church and its Stained Glass*, ed. Sarah Brown and Lindsay MacDonald (Stroud: Sutton Publishing, 2007), 66; Marks, *Stained Glass in England during the Middle Ages*, 211; Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 12, 86.

that as still practiced today amongst stained glass studios, all the Fairford cartoons would have initially been prepared on paper by the glaziers, who would have set out the outlines of the stone openings, the positions of the ferramenta support grid and the divisions of the individual panels to assemble a complete main light.

Before the availability of paper cartoons, glass cutting and leading were undertaken on trestles with lime-wood table tops, whitewashed with chalk and ale. The process is described by Theophilus and has been verified by the discovery of a 14th-century glazing table from Gerona Cathedral in Catalonia, Spain, where the cartoon drawings, lead lines and holes left by the glazing nails used to hold the work in place during leading are all still visible. It is remarkable that the stained-glass panel made from the discovered table can still be seen within the eastern apse of the cathedral.²³

By 1500 times had changed and artist designers were producing full-size cartoons for paintings, frescoes, tapestries and stained glass on paper. Although no Fairford cartoons are known to exist, we know from both treatises and surviving contemporary examples that the lengths of paper required to set out the cartoons were formed by gluing together many separate sheets of paper to give the desired height and width of the opening.²⁴

(Fig. 19)

At this time, sheet paper was predominantly produced in northern France and Italy and was distributed throughout Europe through yearly markets. In Britain the imported paper may have been acquired directly from a London supplier or from Antwerp, a major centre for the paper trade in the Low Countries.²⁵ There is a record in the household book of Henry VII that a said “Tate” had a paper mill in 1498. An earlier reference to this mill belonging to John Tate is made in an edition of Chaucer’s *Canterbury Tales*, printed by William Caxton around 1490. The mill is said to have been near Stevenage just north of London.²⁶

Before passing on the rolls of paper marked with the stone outline, grid of ferramenta support bars and panel divisions to the artist designer, the master glazier had one more

²³ Anna Santolaria Tura, *Glazing on White-Washed Tables* (Girona: Institut Catala de Recerca en Patrimoni Cultural, 2014), 25.

²⁴ Christiana J. Herringham, *The Book of the Art of Cennino Cennini: A Contemporary Practical Treatise on Quattrocento Painting* (London: George Allen & Unwin, 1899), 153; Anne van Oosterwijk and Zsuzsanna van Ruyven-Zeman, “From Paper to Glass: The Working Methods of the Artists of the Gouda Windows” in Zsuzsanna van Ruyven-Zeman et al., eds., *The Cartoons of the Sint-Janskerk in Gouda* (Delft: Eburon Academic Publishers, 2011), 222.

²⁵ van Oosterwijk and van Ruyven-Zeman, “From Paper to Glass,” 222.

²⁶ “The History of Paper,” Confederation of Paper Industries, Updated: March 2013 <http://www.paper.org.uk/information/factsheets/history.pdf>.

unusual task to fulfil. Unlike traditional designs where the imagery is contained within a single opening, the Fairford Vidimuses indicated that the imagery extended across two, five, and in the case of the great west window, seven main lights, with corresponding tracery openings above and below.

The master glazier at Fairford therefore would have had to plot the exact measurements of the mullions separating the main light and the positions of the traceries in relationship to them. This would have enabled the artist designer for the great west window to set out the four radiating rings that centre on Christ's heart, where he is sitting in judgement upon the rainbow with his feet upon the world, positioned in the central light of the upper tier. (Fig. 20) At the minimum four lights and corresponding traceries must have been laid out together in order to set out the radiating circles. The circles would have been set out using either a beam compass or a twine and charcoal stick, set to the diameter of the desired circle from its centre point, which in the case at Fairford is positioned within the heart of Christ.

Cartoons from the early 16th century by the great masters Leonardo, Michelangelo and Raphael have survived, one of the earliest being Raphael's School of Athens circa 1511.²⁷ However the earliest surviving cartoons for monumental stained glass are found in the collection of Sint-Janskerk in Gouda, with the earliest dating from between 1515 to 1525; these were produced for windows that were destroyed in a fire of 1552.²⁸ These surviving examples serve as the best indicators of how the artist designer produced his art. The surviving cartoons like those of succeeding decades are executed in monochrome using black chalk, pen and ink and brush washes with no indication of the colours to be used; however, some later cartoons do indicate colour by reference. Cartoons for tapestries in comparison were usually coloured, in order to guide the weavers during the course of their work, with a section of the cartoon being visible directly through the vertical strands of their looms.²⁹ (Fig. 21)

Cartoons for small-scale stained glass roundels from this period, commonly found within the transom openings of domestic buildings and used as personal devotional imagery, are more numerous and have survived due to their small scale in comparison

²⁷ Arjan R. de Koomen, "Cartoons in Art History" in Zsuzsanna van Ruyven-Zeman et al., eds., *The Cartoons of the Sint-Janskerk in Gouda*, 204.

²⁸ Zsuzsanna van Ruyven-Zeman et al., eds., *The Cartoons of the Sint-Janskerk in Gouda*, 50.

²⁹ Arjan R. de Koomen, "Cartoons in Art History," 210-211.

to monumental cartoons, which are large and have always been difficult to store and keep in ideal conditions.³⁰

It is possible that the Fairford designer also produced more intricate cartoons for small-scale roundels. The tracery head sections of the outer lights in the lower tier of the Judgement of Solomon window have two exquisitely designed roundels. One depicts Samson overcoming the Lion to the left and the other depicts Cain murdering Abel to the right.³¹ (Fig. 22)

A large number of surviving roundels depict the same imagery, suggesting that they were taken from a master drawing and that the practice of reusing drawings and cartoons was a common occurrence.³²

The York Glazier William English (d.1480) left to his son ‘all the cartoons belonging my work’, and Robert Petty (d.1528) obtained his ‘scroes’ from his older brother John which could be reused or reworked in future commissions.³³ The reuse of cartoons by the York glaziers can be seen by comparing two versions of the Holy Trinity, c. 1470 in the churches of St Martin-Le-Grand, Coney Street and Holy Trinity, Goodramgate. In the early 15th century in the western choir clerestory of York Minster at least twelve of the Ecclesiastical Saints can be identified as coming from the same cartoon.³⁴ Earlier examples such as the depiction of the Virgin and Child in Warndon and Fladbury churches (Worcs.), dating from 1330-40 confirm this practice of replication by glaziers.³⁵ (Fig. 23)

What is remarkable is that within the one hundred and thirty-three main lights at Fairford, there are only two examples of the same cartoon being used. The figures of the Prophets Micah and Zephaniah, depicted in adjacent windows nVIII and nVII, in the fourth and second lights respectively are in most respects identical except for differences in the hats and the colours used by the glaziers for the drapery. (Fig. 24)

Directly opposite these Prophets in the south nave aisle are the figures of St Philip in the third light of window sVII and the hybrid apostle with no name within the first light of window sVIII. St. Philip has a yellow nimbus, cross staff and backdrop whilst the other

³⁰ de Koomen, “Cartoons in Art History,” 215; Timothy B. Husband, *The Luminous Image: Painted Glass Roundels in the Lowlands, 1480-1560* (New York: Metropolitan Museum of Art, 1995), 12.

³¹ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 59.

³² Husband, *The Luminous Image*, 66-67.

³³ Marks, *Stained Glass in England During The Middle Ages*, 34.

³⁴ Marks, *Stained Glass in England During The Middle Ages*, 34.

³⁵ Marks, *Stained Glass in England During The Middle Ages*, 33.

apostle has a blue nimbus and backdrop, with a deep amber cross staff. At Fairford, the reuse of cartoons within the tracery lights is moderately frequent. The same angel or saint can be seen repeated or reversed, and may even be depicted identically but holding differing emblems of their martyrdom. Other than these examples the reuse of cartoons can only be found within the various architectural canopy designs above the figures of the apostles, prophets, saints and persecutors of the faith in the nave clerestory windows.

I would suggest that the cartoons used at Fairford were utilised as the designs for later major commissions in other ecclesiastical buildings. For if we date the Fairford cartoons to have been executed between 1503-1504 (and possibly 1505 for reasons discussed later), comparisons show that the Fairford cartoons were remodelled or used directly in the stained glass for Henry VII's Chapel at Westminster Abbey, the glazing of St George's Chapel Windsor, the early windows of King's College Cambridge and Winchester Cathedral, all of which were commissioned between 1505-25.³⁶

Following the destruction of the Reformation there were scant remains of Henry VII's glazing in Westminster Abbey; these remains were photographically recorded by the Royal Commission on the Historical Monuments of England before their complete destruction in the Second World War.³⁷ The images of the remains show a distinct reference to the Fairford glass, with similarities seen in tracery angels, the depiction of the Prophet and the Angel holding a scroll in the predella scene in the East window, which is similar to those beneath the apostles depicted in south nave aisle windows at Fairford. (Fig. 25)

The great west window in St George's Chapel Windsor contains several heads of Kings and other persons that resemble faces found within the windows of Fairford. The Windsor heads are painted in a bolder, more simplified form to enable them to be read from the ground as they are sited at a greater height than those seen at Fairford. (Fig. 26)

At Cambridge, several of the early windows undertaken by Barnard Flower before his death in July or August 1517 show stylistic comparisons to the narrative details of Fairford, even though they are set within architectural backgrounds which are distinctly influenced by the different date of their production. There is however a direct

³⁶ Marks, *Stained Glass in England During The Middle Ages*, 209, 212-3.

³⁷ Marks, "The Glazing of Henry VII's Chapel, Westminster Abbey," 160.

comparison between the head of the councillor from the judgement of Solomon window in Fairford and that of the messenger in King's College Chapel, which is depicted three times in the central light of the Williamson and Symonds windows sited in the north and south walls.³⁸ (Fig. 27)

Other than these examples the recent discovery in the parish church of St. Lawrence, Lighthorne, Warwickshire of a restored figure depicting St Sebastian is clearly a copy of Fairford's south clerestory cartoon of the same image. (Fig. 28) However its background dates from the 19th century, suggesting that the ancient image has been reset from its previous location.³⁹

One notable observation from the surviving cartoons of this period is that they show no indications of lead lines or other working practices being executed directly on the cartoons, unlike the glaziers' table from the Cathedral of Gerona. This suggests that they were hung up beside glass painters as a guide to the effects they had to achieve, just as practised today.

How these cartoons were used to form the cutline for the separate pieces of glass and how the drawn details were transferred to glass will be discussed later (see pages 42-52).

Glass

How these artistic illustrations found in cartoons were then transformed by craft into paintings on light will now be considered. The artist's canvas was glass, a man-made material probably originating from the near East in the second half of the third millennium BC made from silica (sand) and potash derived from the burning of vegetation. These materials when heated become a viscous fluid that, when cooled, hardens to form a brittle material with a smooth glossy surface.⁴⁰

The Romans mass-produced glass which was broken into cullet and exported throughout their empire to hothouses where the glass was re-melted and worked to form vessels and window panes.⁴¹

³⁸ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 93.

³⁹ Colin Such, "The Windows of St. Laurence's Church, Lighthorne." Lighthorne History Society, 2014. <http://www.lighthornehistory.org.uk/site/wp-content/uploads/LH1342014.pdf> [accessed 21 April 2016]

⁴⁰ David M. Jones, ed., *Archaeological Evidence for Glassworking, Guidelines for Best Practice* (Swindon: English Heritage, 2011), 3.

⁴¹ Jones, *Archaeological Evidence for Glassworking*, 25.

However by 1500 when the Fairford windows were made the technology of glassmaking had spread throughout Europe, with major centres of production being located in regions where the natural resources for glass manufacture were abundant. In England, plain colourless window glass was being produced in the Weald of Sussex and Staffordshire and other areas. Documented accounts note the purchase in 1351-2 of glass from the Weald for the glazing in the royal chapels of St Stephen's, Westminster⁴² and for St George's, Windsor.⁴³ Glass produced in England was considered to be of an inferior quality compared with that being imported from mainland Europe. For example, the contract of 1447 for the glazing of the Beauchamp Chapel at Warwick especially stipulates that the glazier, John Prudde, was to use 'Glasse beyond the Seas, and with no Glasse of England'.⁴⁴ This glass from beyond the seas in the latter part of the 15th and 16th centuries was being produced in two major regions.

In Lorraine, Rhineland, located on the West bank of the River Rhine, a high lime low alkali (HLLA) glass was being produced by the cylinder method, predominant at this time. This was termed Rhenish glass in documents,⁴⁵ whilst that produced in Normandy and the Ile de France in the Seine Valley was made by the spun process.⁴⁶

The alchemy of colouring and making glass was a carefully guarded process within these groups of producers, as can be deduced from the scant amount of treatises passed down to us today. Apart from Theophilus writing in the 12th century, Georgius Agricola, who was active in the mid-16th century and Antonio Neri, writing in the 17th century, who describe processes that were widely in use in the preceding centuries, little is known of their secrets.⁴⁷ In an attempt to bring the production of coloured glass to England, Henry VI in 1449 granted a twenty-five year monopoly to John Utynam from Flanders, 'who has returned of late to England at the Kings command', in order 'to make glass of all colours of the windows of Eton College and the College of St Mary and St Nicholas because the said art has never been used in England.' Henry VI must have been confident in this enterprise for he granted Utynam permission to 'engage in all arts, works, sciences lawful and liberal' and 'to instruct divers lieges of the King in

⁴² Harry J. Powell, *Glass-Making in England* (Cambridge: University Press, 1923), 16; G.H. Kenyon, *The Glass Industry of the Weald* (Aylesbury: Leicester University Press, 1967), 27-28.

⁴³ Kenyon, *The Glass Industry of the Weald*, 27.

⁴⁴ Marks, *Stained Glass in England During the Middle Ages*, 30.

⁴⁵ Marks, *Stained Glass in England During the Middle Ages*, 30.

⁴⁶ Caen, *The Production of Stained Glass in the County of Flanders and the Duchy of Brabant*, 238-239.

⁴⁷ Jones, *Archaeological Evidence for Glassworking*, 13.

many arts never used in threat of the realm'.⁴⁸ He was also granted permission to sell surplus glass tax free and protected against competition by a prohibitive fine of £200 or indefinite imprisonment. However, Utynam's endeavours were seemingly fruitless in being able to produce coloured glass in England and no competition arose.⁴⁹ We can therefore conclude that the coloured glass used at Fairford was obtained from overseas.

As discussed we have two known centres for the supply of coloured glass in the late 15th century. Rhenish glass, made in the region of Lorraine, was manufactured by the cylinder method, a technique described by Theophilus in the 12th century. When making cylinder glass, the glass blower gathers molten glass from the pot on his blowing iron, then having blown his bubble, he swings it at arm's length until it forms an elongated shape. An assistant then pierces the end of the cylindrical bubble and following reheating opens up the pierced hole to form a cylinder shape with a conical top tapering towards the mouth of the blowing iron. (Fig. 29) The conical top is then cut off with shears to form the full cylinder. The cylinder is cut along its length on a flat table and placed in an annealing chamber where it is opened up and ironed flat with a wooden block, probably of black poplar, which was known to be a slow burning wood. This process would form a reasonably sized rectangular sheet of glass.⁵⁰

The other coloured glass, from the region of Normandy, was produced by the spun process. Spun coloured glass was certainly used for the Fairford windows, as we found pieces of coloured glass with uncut curved edges from the original spun sheets. The early 16th-century rose window in the south transept of York Minster also had the centres from coloured spun sheet located in the twelve shallow trefoil eyelet traceries. (Fig. 30) The author was an apprentice during the restoration of the rose window between 1968 -70, when these eyelets were substituted with newly painted roundels containing the letter S, in memory of Lord Scarborough, the first high steward of the Minster.

To produce spun sheets the glass blower would gather molten glass from the pot and blow a bubble; his assistant using a pontil rod would gather a small blob of glass from the pot and attach it to the end of the bubble. The bubble was then sheared from the blowpipe end and opened up; following reheating in the furnace it was then spun until,

⁴⁸ Carola Hicks, *The King's Glass: A Story of Tudor Power and Secret Art* (London: Chatto & Windus, 2007), 46.

⁴⁹ Hicks, *The King's Glass*, 46; Kenyon, *The Glass Industry of the Weald*, 88.

⁵⁰ Theophilus, *On Divers Arts*, 55.

by centrifugal force, it opened up to form a circular disc. (Fig. 31) When cooled this disc, with its distinctive pontil-marked centre, formed a circular sheet of glass.⁵¹

By the nature of the chemical constitution of glass at this period, no entirely pure clear glass was being produced, all having a slight tint varying from a grey-yellow to grey-green or grey-blue. The intensity of these tints varied dependent upon the thickness of the glass sheet; the thicker the sheet the deeper the intensity of tint was produced. As well as the thickness of the sheets, the other important consideration was the clarity of the glass being produced. For the domestic market requiring clear glass, where transparency and the minimum amount of tint was important, glass produced by the spun process was the favoured option. It could be manufactured to be thin towards the edges and also smooth, for unlike the cylinder method, it did not need to be ironed flat with a block of wood, a process that produced an irregular surface with seed marks and other blemishes. The cylinder method was however acceptable for the stained glass market as clarity was not an issue as it would be painted and stained, which obliterated clarity and any imperfections.

Regarding the practicalities of either production method, the blowing irons were made to a safe length ensuring the glassblower was not harmed by the intensity of heat radiating from the gathered blob of molten glass. With the spun process, the circular disc could be cut on either side of the central pontil-mark, to create several rectangular panes descending in size. However, with the cylinder method, the blown bubble could be elongated by swinging to a determined length, only constrained by the height of the blower. Therefore with this method a singular large rectangular pane could be produced.

Having conserved stained glass of all periods for over forty five years, I have observed that the average thickness of glass used up to the middle of the 15th century varies between 3 to 6 mm in thickness. In addition, the gradation in thicknesses within the sizes of pieces used suggests that spun glass was predominantly being used for stained-glass windows. It is evident from my observations that a change in the methods of producing cylinder glass occurred during the latter half of the 15th century, for the glass used for stained glass windows, especially the clear whites, became considerably thinner than those of preceding periods, being on average between 2 to 3mm in thickness.

⁵¹ Percival Marson, *Glass and Glass Manufacture* (London: Isaac Pitman & Sons, 1922), 89-90.

I suggest that a simple technical development in the glassmaker's methods occurred during the latter half of the 15th century that is still used today in the glass-blowing factories of Germany (Lamberts), Poland (Jasło) and France (Saint-Just). Here the glassblowers swing their bubble over a pit to elongate the cylindrical bubble beyond the blower's arm length. The weight of the gathered molten glass is the same, but by being stretched into a thinner elongated bubble it forms a cylinder that creates a larger, but much thinner area of glass. This change in production technique, which resulted in thinner sheets of glass, would have had a major impact on its commercial value.

Glass at this time was sold by weight;⁵² therefore the buyer could purchase a greater area of this thinner cylinder glass at a higher price per weight than the thicker, heavier spun glass, but with a greater area of usable glass for the money. It is rational from a business perspective that a glass with a larger surface area at a weight matching competitors created a distinct advantage. The glaziers using glass for stained glass windows would logically use this more economic glass, which would in turn increase the demand for glass produced by the advanced cylinder method.

Another factor which would increase demand for these thinner larger sheets of cylinder glass was the change in fashion to produce stained glass windows in the style of Netherlandish panel paintings. Established native English glaziers were still producing windows in the established traditional method, using relatively small scale pieces of glass to produce their depictions, for example in the Magnificat window at Great Malvern Priory, executed in 1501-2;⁵³ whereas the immigrant Flemish glaziers, who produced the Fairford windows, produced their depictions with the minimum amount of lead work. Consequently they required the largest panes of glass available to create the canvas for their depictions.

In the Fairford windows, the four panes of white glass at the top of the fourth light above the depiction of the Presentation of Christ in the Temple, in window nIII, measure at least 24 cm wide by 30 cm high, which suggests by mathematical calculations that a spun sheet was not used. Allowing for the unusable central bull's-eye a disc of at least 68 cm in diameter would have been needed to be spun to obtain a pane at 24 cm x 30 cm. In comparison the painted roundels produced during this period, using spun glass, had a diameter averaging 20 cm. These calculations and the fact that

⁵² Marks, *Stained Glass in England During The Middle Ages*, 31.

⁵³ Marks, *Stained Glass in England During the Middle Ages*, 42; G. McN. Rushforth, *Medieval Christian Imagery* (Oxford: Clarendon Press, 1936), 369.

the white glasses used at Fairford are thin suggest that they were obtained from sheets made by the advanced cylinder process.

None of the coloured glass used at Fairford, however, have panes that exceed those of the white glasses. Coloured pieces used in the glazing do match the 30 cm in height, but seldom match the 24 cm in width without being tapered to a much narrower dimension, either at the top or base of the piece. This observation, in conjunction with the evidence found in the Fairford glazing, where many of the coloured eyelet traceries that flank the main lights of the windows still retain the uncut curvature of spun glass discs, suggests that the coloured glasses used at Fairford were produced in Normandy by the spun process.

Chemical analysis of 66 samples from the Fairford glazing scheme were undertaken by the University of York, and the results published in a D.Phil Thesis by Paula Jayne Mills.⁵⁴ This analysis shows that the glass used at Fairford has two distinct types of basic composition indicating differing manufacturers of the glass. Mills and Cox in a subsequent paper state 'It is clear that there are two principal groups. These groups are not due to the different ages of the glass, as might be expected, but it appears that the blue/colourless/ruby glass from Fairford is of a distinctly different composition to the remainder of that group, ie. the coloured glass at Fairford is not of the expected late European type but still that of the earlier medieval period.'⁵⁵ A more recent analysis of about a hundred samples taken from window nVIII has been undertaken by Ian Freestone using more sophisticated equipment, energy dispersive X ray spectrometry and Laser Ablation Plasma Mass Spectrometry.⁵⁶ His results confirm the earlier results that the Fairford glasses fall into two groups. The majority, commonly called high-lime low-alkali glass (HLLA), include most of the white colourless, flashed red and blue glasses, and the remainder is of the composition of the earlier medieval period. Results from a survey of historic uncoloured glass by David Dungworth of English Heritage suggest that glasses of these HLLA types were not produced in England until around 1570.⁵⁷

⁵⁴ Paula J. Mills, "A study of the atmospheric corrosion of medieval window glass in the United Kingdom," (DPhil thesis, University of York, 1995).

⁵⁵ P.J. Mills and G.A. Cox "Medieval Windows: What Can Chemical Analyses Tell Us?" (unpublished draft publication, see Appendix 1).

⁵⁶ Ian Freestone report (unpublished, see Appendix 2).

⁵⁷ David Dungworth, "The Value of Historic Window Glass," *The Historic Environment* 2(1) (2011): 33; David Dungworth, "Historic Window Glass," *Journal of Architectural Conservation* 18(1) (2012):14.

In conclusion it appears that the Fairford glass was sourced from two different workshops in continental Europe, such as the region of Normandy where the yellow, amber, green, pink, some of the reds and some of the blues were produced by the spun method. In contrast the white glass and most of the blues and flashed reds were probably made by the cylinder method and possibly sourced from Lorraine.

Glass Types used at Fairford

During the period of conservation by Barley Studio of the Fairford windows, it was observed that the glasses used in the creation of the windows were generally consistent in colour and tint throughout the scheme. However a few more specialist glasses were selected and introduced to enhance the depictions in the windows.

It is estimated that, of the white glasses used, around 90% had a tint of a yellow hue with a hint of green; while 9.9% had a tint of blue with a hint of green. An exception to these types, accounting for the remaining 0.1% of the white glasses, was found in window sII which depicts the deposition of Christ, the Entombment and the Harrowing of Hell. Here the flesh tints of the living were painted on a glass with a slight pink tint, to differentiate between the dead and the living depictions of Christ. Unfortunately the high manganese content of these slightly pink tinted glasses has oxidised within the main body of the glass, rendering them blackened and semi opaque.

The white glasses used are between 2 - 3mm in thickness and consistently thinner than all the coloured glasses used in the glazing scheme. The pieces of coloured glass used are between 2.5 – 4mm in thickness. This fact, in conjunction with the sizes of the white pieces, which are considerably larger than the coloured pieces in both height and width, suggests that they were produced by the advanced cylinder method, whereas the majority of the coloured glass was produced by the spun method as discussed in the previous section of this dissertation.

The small elongated eyelet tracery sections (Fig. 32) set adjacent to the jambs in the windows at Fairford predominately contain unpainted coloured glass pieces. Several of these eyelet pieces still retain the original uncut curved edges, a common characteristic of glass produced by the spun process. (Fig. 33)

From the evidence of the curved outer edges it can be determined that the spun glass discs had a diameter of approximately 48 – 50 cm. (Fig. 34) On setting out a circle to these measurements, and allowing for the unusable central pontil rod bullseye, the

largest rectangle one could cut from these spun sheets would be approximately 30 cm high x 16.5 cm wide. This would relate well to the scale of the coloured glass pieces used in the glazing scheme, none of which exceed these dimensions. (Fig. 35)

The palette of colours used throughout the glazing scheme is consistent, suggesting that they were obtained from the same source and possibly purchased as one consignment to undertake the whole glazing scheme. There are three blue colours, predominately a deep cobalt and a mid-blue, used for drapery and architectural background; and an ice-grey blue for armour. There are two green colours, mostly used for foliage but also for drapery, one a rich green-blue and the other a pale sage. Two yellows, a pale amber and a deeper amber, are used in a variety of ways for architectural backgrounds, nimbuses and drapery. The yellows produced by silver stain will be discussed later (see pages 50-51). Of the pinks and purples used for drapery and architectural background there are a plum, a deep violet and a rich pink. All the colours mentioned fall into the category of pot-metal colours, where the colour is embedded throughout the full thickness of the glass.

Other colours used in the glazing scheme fall into the category of flashed glass, where the main thickness of the glass is one colour and a thinner skin of another colour is added during the gather and blowing process of glass manufacture. This type of glass was originally produced to overcome a difficulty in producing a red colour from copper. If gathered and blown as a pot metal the red colour is so intense that hardly any light can pass through and it appears to be black. By the early 15th century red glasses were being manufactured using the flashed glass process, whereby the glass-blower gathered a small amount of copper ruby from one pot and then a larger portion of tinted white glass from another pot, so that when blown the result was a tinted white glass with a thin skin of copper ruby that when put against light resulted in shades of red from deep to light, depending on the thickness of the skin layer.⁵⁸

In the Fairford scheme there are instances of other colours that would have been produced using the flashed glass technique. During Barley Studio's conservation works, a flashed green on white glass⁵⁹ and a red on blue glass, which produced a deep ruby, were found. (Fig. 36) The demon in the scene depicting the Harrowing of Hell in window sII panel 4c is an example of red on blue to produce a deep violet glass. (Fig.

⁵⁸ Jerzy J. Kunicki-Goldfinger et al, "Technology, production and chronology of red window glass in the medieval period – rediscovery of a lost technology," *Journal of Archaeological Science*, 41 (2014): 102.

⁵⁹ Mills, "A study of the atmospheric corrosion of medieval window glass in the United Kingdom," 200.

37) However it is possible that this violet may just be a darker piece of an extraordinary glass that was also used in the scene of Lucifer, and adjacent pieces in the west window, w1, 1g (Fig. 38) where it appears that some pieces are double flashed, with the main body being white, then a thin flash of blue and another thin layer of red applied on top. These speciality glasses also appeared in prestigious French windows, such as the west rose window of the Sainte-Chapelle, Paris, manufactured in the 1490s.⁶⁰

In a section of the west rose window in the Sainte-Chapelle, Paris, is a depiction of a mighty angel casting a great millstone into the sea. The angel has a robe of white glass, on which red, blue and pink bands have been trailed on during manufacture, creating a striated glass of three flashed colours. (Fig. 39)

A similar striated glass, perhaps the earliest known to be used in England, has been used in Fairford to good effect, on the dragon from which St. Margaret erupts in window SIII 1c, where only bands of red have been applied. This glass was then enhanced with yellow stain to produce three colours on the same piece to create a scale-like effect. (Fig. 40)

This particular type of single-colour striated glass used at Fairford was selected, along with another special glass, mottled with flashed red, for a figure located in the church of Sainte-Marie-Madeleine, Verneuil-Sur-Avre, France. (Fig. 41) The figure in this window has been given a suggested date of around 1470,⁶¹ but a date of around 1480 – 1490 would seem more likely, as these types of specialist glasses are not commonly found until the last decade of the century.

Two other similar types of flashed glasses were used in the Fairford scheme; the first one graduates from colour to clear across the piece and was used to create the dramatic effect in the depiction of a lost soul held in limbo from the scene of ‘The Harrowing of Hell’ in window sII 2c. (Fig. 42)

The second type of flashed glass is streaky with waves of flashed colour, varying in intensity across the piece. This type of flashed glass was used exclusively in the depiction of scenes of Hell in the west window of Fairford, wI lights f and g. (Figs 36 and 43) The colour of the flash has aroused curiosity for at its deepest colour it appears red, yet distinctly different than the red produced by copper which tends to be more

⁶⁰ Paul Frankl, revised by Paul Crossley, *Gothic Architecture* (New Haven and London: Yale University Press, 2000), 130.

⁶¹ Martine Callias Bey et al., *Les Vitraux de Haute-Normandie* (Paris: CNRS Editions, 2001), 214.

orange in tone. At its thinnest the colour appears in shades of pink, which resemble a gold pink colour available to stained glass artists today. When restoring missing areas of the Hell scenes, Barley Studio had to source the most intense sheets of gold pink to match the red colour originally used. Gold pink is named as such because the colour is formed by the use of metallic gold; however there is no evidence of gold being used to colour glass between the 10th and 16th centuries until glassmaker Johann Kunckel (1637?–1703) rediscovered the process in the 17th century, ushering in a high point in the popularity of gold ruby glasses for a relatively brief period from about 1685 to 1705.⁶² Unfortunately no chemical analysis of Fairford’s west window glass was undertaken; however I would speculate that based on the observations above, a gold ruby glass was used.

The technology for producing a simple flashed layer of red glass on a white (colourless) base, typically covered with a thin white coperta layer, evolved from around 1400.⁶³ By the end of the 15th century, it can be seen from the examples at Fairford that glassmakers had experimented with and were producing flashed glasses in colours other than red, as well as flashing colour on colour. This innovative evolution of producing speciality glasses continued into the mid-16th century, when for example red flashed mottle on green glass was being produced and used to good effect in the depiction of marble pillars in the windows from Herkenrode Abbey, now sited in the Lady Chapel of Lichfield Cathedral and conserved at Barley Studio between 2010 and 2015. (Fig. 44)

Glass Cutting

The cutting of the glass for the Fairford glazing was of the highest standard and demonstrates the impressive skills the glaziers possessed. In their endeavour to produce these windows with the minimum of leading, they went to extraordinary labour-intensive ends to achieve their desired effect. The head of the Virgin Mary from window nII panel 1a is one of numerous examples where these skills can be observed and admired. Here the Virgin Mary’s head has flowing hair, which separates over the shoulders and then cuts inwardly, to allow the drapery to be inset up to the neck line; to create this effect demanded extraordinary skills. (Fig. 45)

I suggest that the glaziers who cut glass for the Fairford glazing did so in a way similar to, but in reverse of, how the conservators at Barley Studio approached the scheme

⁶² Dedo von Kerksenbrock-Krosigk, “Gold Ruby Glass,” in *Glass of the Alchemists: Lead Crystal–Gold Ruby, 1650–1750* (Corning: Corning Museum of Glass, 2008).

⁶³ Jerzy J. Kunicki-Goldfinger et al, “Technology, production and chronology of red window glass,” 102.

during restoration. At Barley Studio we reconstructed the original outline by setting out the given opening, then setting out the distance between the horizontal bar lines and aligning edge pieces that followed the original grozed edges in order to set out the grid. Then like a jigsaw, we set out the remaining pieces guided by the accuracy of the original cutting. When all the pieces were in position we drew around them to reproduce the original cut-lines.

In contrast, it is probable that the Fairford glaziers cut their glass on whitewashed tables, as had been practiced in previous centuries and described by Theophilus in the twelfth century. The 14th-century glazing table, on which the glass made still survives in the eastern apse of the cathedral of Girona, is evidence of this practice.⁶⁴ (Fig. 46) Certainly 16th-century prints of glazing workshops, post Fairford, show glaziers leading directly on wooden tables. (Fig. 47)

I suggest that whitewashed tables used for the Fairford glazing were initially set out with lead or charcoal lines that detailed the stonework opening dimensions, the horizontal bar lines, geometric design features such as borders and repetitive canopy patterns and possibly a centre line as a guide to the position of the vertical stanchion. The non-geometric elements to be set out within these gridlines, that depicted figures and narrative scenes, would have been created as the glass cutting progressed, guided by the drawings on separate cartoons.

All the clear white glass and pale colours, transparent enough to see through when laid over the cartoon and table, would have been the first to be cut. They would follow the preliminary lines set out on the table or were taken from the shapes indicated on the cartoon. All approximation of the shapes would have been set out on the stock panes of glass and then roughly cut to shape, before being grozed to the desired accurate shape. These pieces would then be set into position on the table and lines would be drawn around their edges to form the transparent glass areas of the imagery on the cutting table.

The intense colours, the reds, deep blues, greens and purples, which when laid over the cartoon or table would have obliterated the drawn detail beneath, would have been cut by a method of transfer. Either a template of the shapes required was created on paper and laid over the deep coloured glass, allowing the shape desired to be drawn around, or an outline of the desired shape would have been made on tracing paper, with the glass

⁶⁴ Santolaria Tura, *Glazing on White-Washed Tables*, 25.

then covered in powdered chalk from a muslin pounce bag. The tracing would then have been laid over the chalk-covered glass surface and with a point being drawn around the traced lines to leave the desired shape impressed on the layer of chalk.

It is also possible that they laid the intense coloured glass in its approximate position on the table and set the previously cut transparent pieces in position on top to draw the outline around their edges.

Whatever method was used, the piece would have been roughly cut to shape then finely grozed to shape so that it fitted into the intended design like a jigsaw piece, within the outlines formed by the previously cut clear pieces. This freestyle method of cutting the deep coloured pieces is evident when comparing the difference in the shapes of pieces found in the two Prophet figures made from the same cartoon in windows nVIII light d and nVII light b. (Fig. 24)

The earliest surviving reference to the medieval process of glass cutting is found in the 12th-century treatise “On Divers Arts”, written by Theophilus, who clearly explains the techniques of the time: ‘heat on the fire an iron cutting tool, which should be thin everywhere except at the end, where it should be thicker. When the thicker part is red hot, apply it to the glass you want to cut, and soon there will appear the beginning of a crack. If the glass is hard, [and does not crack at once], wet it with saliva on your finger in the place where you had applied the tool. It will immediately split and, as soon as it has, draw the tool along the line you want to cut and the split will follow.’⁶⁵ I believe this was the primary method used by the Fairford glaziers. However we also have a later treatise, written in the 14th century by an experienced glazier, known as Antonio da Pisa. An example of one of his windows, which was commissioned in 1395, survives in the nave of Florence Cathedral.⁶⁶ Antonio da Pisa mentions the cutting of glass using a hard stone, such as diamond or flint. This is the earliest known reference to diamond cutting of glass,⁶⁷ and could link to the glaziers’ sorting marks found on the apostle windows in the south nave aisle of Fairford.

From experience the cutting of shapes is haphazard using a diamond, but successful in the cutting of straight lines. It may be possible that stage cutting was used at Fairford,

⁶⁵ Theophilus, *On Divers Arts*, 62-63.

⁶⁶ Claudine Lautier and Dany Sandron, *Antoine de Pise. L’art du vitrail vers 1400* (Paris: Éditions du Comité des Travaux Historiques et Scientifiques, 2008) reviewed by David King, “Antoine de Pise. L’art du vitrail vers 1400,” *Vidimus* 44 (Oct 2010). <http://vidimus.org/issues/issue-44/books-2/>

⁶⁷ Claudine Lautier and Dany Sandron, *Antoine de Pise. L’art du vitrail vers 1400* (Paris: Éditions du Comité des Travaux Historiques et Scientifiques, 2008) reviewed by David King, “Antoine de Pise. L’art du vitrail vers 1400,” *Vidimus* 44 (Oct 2010). <http://vidimus.org/issues/issue-44/books-2/>

where the rectangular shapes were cut by diamond, a speedy process, and then the approximate shapes cut using a hot iron, then finished to precise edges with the grozing iron. (Fig. 48)

The technique of grozing was described by Theophilus, who instructed following the cutting with the hot iron: ‘When all the pieces have been cut like this, take a grozing iron, a span long and bent back at each end, and trim and fit together all the pieces with it, each in its proper place’.⁶⁸ The grozing iron nibbles chips of glass from the edges to shape the glass, leaving a very distinctive nibbled chamfered edge. (Fig. 48)

It can be seen that the bent-back ends of a double-ended grozing iron have a large and a small opening at the two ends to accommodate differing thicknesses of glass.

Once all the cut pieces were laid out on the table and put in place the pre-painting surface decoration of abrading and piercing would have been undertaken.

Abrading and piercing

Abrading, the method used to scrape or grind away flashing to expose the base glass, was used on the Fairford glazing scheme. The Fairford glaziers were masters of the technique of abrading flashed red glass to create jewel-like effects for the decoration of drapery, brooches and other ornament. Using the technique they could remove the thin layer of flashed copper ruby to expose the clear, main body of white glass beneath. They could then apply the silver stain to the white glass to produce a single piece of glass possessing three colours, red, white and yellow.

The glaziers used two different methods of removing the red flashed layer when abrading. One method was to create perfect circles using various types of drills. The drill may have been of the bow type seen hanging from the wall, just above the stack of glass on the glazier’s bench, in the print *Der Glasser*, dating from 1568.⁶⁹ (Fig. 47)

Other types of drill that could have been used include a brace, a strap drill or pump drill. (Fig. 49) The strap drill required two persons, the craftsman controlling the pressure and direction and the apprentice operating the cords. Whatever type of drill was used, it is likely that the tip or point was formed from lead.

When drilling, the glaziers would have formed a well around the piece of glass to be drilled; the walls of the well would probably have been formed using clay into which

⁶⁸ Theophilus, *On Divers Arts*, 63.

⁶⁹ Caen, *The Production of Stained Glass in the County of Flanders and the Duchy of Brabant*, 304.

was added water or more probably linseed oil. Crushed emery stone forming a powder would then have been added to the oil or water before the drilling commenced. It is clearly evident from the end results that the method of drilling was a controlled and accurate process, producing a concave abrasion through the layer of red flash. (Fig. 50)

The other method which created non-circular abrasions was a far cruder and more labour-intensive operation, likely to have been delegated to the apprentices. This operation was probably undertaken using solid emery stone formed to points and other shapes, and laboriously rubbed in a forward and backward motion like a file on metal, until the desired exposure of white glass had been achieved. The score marks and scratching evident beyond the area required to be clear found on existing pieces demonstrate that this procedure was freehand and relied on the skill of the practitioner.

The persecutor depicted in light b of window NIV in the north clerestory demonstrates the extraordinary lengths the Fairford glaziers went to in their quest to produce dramatic effects, through the techniques of abrading and piercing which required minimum leading. When we consider that the work was undertaken for glazing of a light at clerestory level it underlines the “no expense spared” instructions demanded by the donor. (Fig. 51)

On the surcoat of this persecutor, dots joining the diamond lozenge pattern have been drilled and stained with silver to produce yellow. The diagonal sash band and buckles have been hand abraded and stained or left clear white to produce the desired effect.

Looking at the scabbard of the sword, hand abrading and staining has also been undertaken; score marks beyond the exposed area of white glass can be seen demonstrating the difficulties in maintaining control when abrading free shapes. (Fig. 52)

Piercing was another technique employed by the Fairford glaziers. This technique was beyond abrading, but basically used the same techniques. The glass would have been drilled beyond the depth of the required exposure of white glass, through the complete thickness of the glass. Once broken through, a small headed grozing iron would have been inserted through the hole to nibble the pierced hole into circular shape. Then a glass of another colour would have been cut and grozed to the shape and size of the piercing and inserted complete with its lead calme edging. This technique was used extensively for the banding across the horses in the upper tier of the Crucifixion scene in the east window. (Fig. 53) In the example of the persecutor (Fig. 51) the glaziers have

gone one step further. Having first drilled the hole, they have then grozed a quatrefoil shape in order to insert a piece of blue glass into what is just mere architectural detail to achieve the desired effect without the addition of visually disrupting leadwork. (Fig. 54)

Another form of abrading the glass surface at Fairford is with sorting marks, scored on the outer surfaces of the glass pieces. (Fig. 55) This was a peculiar practice and can only be attributed to one particular workshop's working practices as these sorting marks are not found in the other Fairford windows.

These sorting marks only appear on the three windows that depict the twelve apostles in the south nave aisle windows sVI, sVII and sVIII. Wayment refers to these marks and includes sketch drawings of them in the catalogue section of his study, but only refers to finding marks on windows sVII and sVIII.⁷⁰ He previously published an article in 1982 on the subject which raises valid points but I would dispute his assumptions that the marks were made after firing and scored with nail or needle.⁷¹

From my experience of sorting, I would suggest that it is more probable that the marks were made at the glass cutting stage, to help the glaziers identify which light the repetitive architectural pieces belonged to following the firing process.

It is possible that these scored sorting marks were made with the sharp point of the emery stone used for the abrading of the flashed red glass. However on close inspection of these marks I would propose, due to the precise and controlled forms, that they were made with a diamond pencil, possibly adapted by the glaziers from links with the craft of engraving.

Workshops

The revelation of the sorting marks helps the understanding of how the production of large-scale projects worked at the end of the 15th century. As commented in the ferramenta section (pages 22-23), three differing methods of producing the lug-bar ends were identified, suggesting three different blacksmith workshops had produced the metalwork. The same findings apply to the glazing, where sorting marks were used only on the set of Apostle windows, suggesting that more than one workshop was responsible for producing the Fairford glazing scheme.

⁷⁰ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 49-51.

⁷¹ Hilary Wayment, "The Glaziers' Sorting Marks at Fairford," in *Crown in Glory: A Celebration of Craftsmanship: Studies in Stained Glass*, ed. Peter Moore (Norwich: Jarrold and Sons, 1982), 23-28.

The glazing of the Fairford windows has been attributed to the king's glazier, Barnard Flower, for logical reasons, Flower being the only Flemish glazier with the manpower and a workshop large enough to undertake works on this scale.⁷² I certainly would not rule out his involvement with the glazing of the Fairford windows, as it is difficult to comprehend who else would have had enough workshop space to set out the radiating circles, extending across the seven upper main lights and into the upper and lower tracery sections of the great west window. A glazing campaign on this scale would have demanded an overseeing organiser, possibly Sir John Saville as suggested by Wayment⁷³ and a great deal of manpower; this is evident in the glass painting alone, where Wayment lists a string of differing glass painters by their painting styles, identifying them as glazier A, D, C, L, Z and so on.⁷⁴

The Flemish immigrant glaziers at this time had established themselves in Southwark, on the other side of the river Thames from the main city of London. The London glaziers guild was within the city but their jurisdiction did not extend as far as Southwark, where the immigrant glaziers were gaining the lion's share of glazing commissions, by producing windows in the fashionable early Renaissance style of the time.⁷⁵

Although the London glaziers guild had no jurisdiction over the immigrant glaziers they had secured legal restriction on the manpower they were permitted to have in a workshop, i.e. alien glaziers were unable to employ more than two assistants.⁷⁶ The only exemption was Barnard Flower, the King's Glazier, who had been granted permission to employ more assistants in order to meet the demand of the King's commissions.⁷⁷

We know of another successful immigrant workshop active at this time, headed by Adrian Andru, who with Flower supplied pre made glass panels for the decoration of a hall in the Bishop's Palace on the occasion of Prince Arthur's marriage in 1501.⁷⁸ He was also responsible for the glazing of the west window in St Margaret's, Westminster and was a member of a team of glass-painters working with Barnard Flower at the Tower of London, Westminster Hall and the royal palaces at Eltham and Greenwich

⁷² Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 95, Hicks, *The King's Glass*, 85.

⁷³ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 95-96.

⁷⁴ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 90-94.

⁷⁵ Hicks, *The King's Glass*, 74-79, Marks, *Stained Glass in England during the Middle Ages*, 206-207.

⁷⁶ Hicks, *The King's Glass*, 75.

⁷⁷ Hicks, *The King's Glass*, 148.

⁷⁸ Hicks, *The King's Glass*, 82.

between 1500 and 1502. Andru was paid a wage for his assistance in these tasks.⁷⁹ It is possible that Andru and other aliens were sub-contracted by Flower to produce the windows at Fairford. This would explain the number of different painting styles of glass painters that can be detected in the glass painting at Fairford. It is also a possibility that the discovered 'A's within the Fairford windows, discussed in part two of this dissertation, may be the workshop signature of Adrian Andru.

Paint and Pigments

The metallic oxide pigments used to paint the Fairford glass evolved from those described as early as the 12th century in the writings of Theophilus. His pigment recipe states that one-third copper, burnt until powdered, one third finely ground green and one third Byzantine blue glass are mixed and ground together with either wine or urine.⁸⁰ The ground green and Byzantine blue glasses had a high lead content and low melting point which, when ground, made them ideal as a flux to allow the vitreous paint to fuse to the glass during firing.

By the end of the 15th century this recipe had changed, with either iron oxide being used instead of copper or more commonly, a mixture containing both iron and copper oxide.⁸¹ These combined mixtures would deliver differing hues from red brown to brown and black. The proportion of the ingredients resulted in a shade of colour that when applied as paint gave a distinct effect to the colour of light passing through the glass. (Fig. 56)

The decoration of opaque trace lines and transparent shading applied to the Fairford glasses using metallic oxide paints was surprisingly consistent throughout the scheme of all twenty-eight windows. During Barley Studio's restoration work to the windows it was necessary to blend six different commercially available pigment colours in precise proportions to produce a shade that matched these used in the original painting of the Fairford glazing scheme.

Given that the windows were made in several workshops as suggested in the workshop section, it might have been expected that differing shades of paint would have been discovered. However, the predominant pigment used at Fairford was a warm chocolate brown when viewed in transmitted light. This colour is so consistent that it indicates the

⁷⁹ Richard Marks, "A Will Casts Light: Robert Hunt and the West Window of St Margaret's Westminster," *Vidimus* 30 (June 2009) <http://vidimus.org/issues/issue-30/feature/>

⁸⁰ Theophilus, *On Divers Arts*, 63.

⁸¹ Caen, *The Production of Stained Glass in The County of Flanders and the Duchy of Brabant*, 265.

paint pigments had been purchased from the same source to undertake the whole commission, and distributed to the employed workshops.

A second type of paint pigment selectively used in the Fairford windows has an orange hue. It is commonly called sanguine, which can be either translucent or, as it is used at Fairford, a coloured pigment that is not transparent.⁸² This sanguine pigment is derived from rusted or oxidised iron that when applied gives an orange hue to the light passing through the glass. At Fairford the artists made use of this pigment to provide a hint of colour to the hair of selected heads. It was used to a greater extent to produce the effect of coloured patterned tiled flooring. (Fig. 57)

Stain

Another form of decoration the glass painter could apply was yellow stain. This process originated from the decoration of vessel glass in the Middle East and first appeared in stained glass windows in the first decade of the 14th century.⁸³ An early example of the technique can be found in the chancel windows of Stanford on Avon church, Northamptonshire, dating from c.1325. (Fig. 58) Yellow stain has been applied to the alternating ivy leaves in the border, the alternating letters on the inscription and on the keys held by St. Peter. The remaining yellow glasses are pot metals.

The use of silver stain in windows increased during the 15th century and its abundant use in Fairford's glazing scheme is evident. At Fairford, silver stain was used to decorate the external surface of the glass producing tones varying from a lemon yellow to deep amber. The intensity of colour derived from the stain depended on the concentration of silver applied and the composition of the glass on which it was applied.

Stain was produced by turning the metal silver into a silver salt by a process of chemical distillation using acidic water. The method is described fully in a beautifully illustrated early 17th-century manuscript held in the Museum Plantin-Moretus in Antwerp.⁸⁴

The silver salts were mixed with a carrier of ground burnt clay and, when applied to the external surface of glass and fired in the kiln, they reacted with the glass surface leaving a transparent yellow stain.⁸⁵

⁸² Caen, *The Production of Stained Glass in The County of Flanders and the Duchy of Brabant*, 273.

⁸³ Lisa Pilosi and David Whitehouse, "Early Islamic and Byzantine Silver Stain" in *New Light on Old Glass: Recent Research on Byzantine Mosaics and Glass* ed. Chris Entwistle and Liz James (London: The British Museum, 2013), 32.

⁸⁴ Caen, *The Production of Stained Glass in The County of Flanders and the Duchy of Brabant*, 253 and 396-97.

In the Fairford windows, silver stain is found to be used frequently for the colouring of nimbuses, hair, drapery and other architectural features on white glasses. A notable exception is that the painters must have discovered that the stain, when applied to the palest of blues used in the Fairford colour palette, would produce a visible yellow effect. It was therefore used for additional effects on this particular shade of blue seen on armour, landscape backgrounds and demons. (Figs 59, 60)

Glass Painting

The painting of the glass at Fairford would have been undertaken using brushes of various types, much as used to this day. Certainly we can see from studying the glass painting of Fairford that laying on mops, tracing and hog-hair stipplers were the main brushes used, with the highlights formed with stiff haired punching brushes and stick work. (Fig. 61)

If we look at the demon from Fairford window NV A1 these painting methods are evident. (Fig. 62) The intensity of wet stipple work applied remains on the lower cheeks, sides of the forehead, between the eyes and lower neck. This density of stipple work has then been punched through when dry to lighten areas and to create highlights seen on the centre of the forehead, upper cheeks and shoulders. Then semi-transparent pigment brush flicks have been applied on top of the stipple work. These brush flicks are on the upper and lower cheeks, the side of the forehead, radiating from the chest and to the outer edges of the eyes. Over the top of these previous applied layers there have been opaque trace lines painted, to accentuate the main features and shapes. Once dry the painter has used both stiff brushes and sticks to scratch through all the previously applied layers to expose the raw brilliance of the glass beneath.

This order of applied layers where the trace lines are painted last, as seen in this image, is the reverse of what is generally done today and as written by Theophilus in his treatise of the twelfth- century, where the opaque trace lines are instructed to be applied as the first stage. This may seem obvious, as the painter would need the outline to know where to apply the modelling.

The actual method and understanding of the order of application the Fairford glass painters followed became evident, following a remarkable discovery made whilst

⁸⁵ Keith C. Barley, "Tests et Observations à Propos de l'Usage du Jaune d'Argent," in *Grisaille, Jaune d'Argent, Sanguine, Émail et Peinture à Froid* ed. Jacques Barlet (Liège: Commission royale des Monuments, Sites et Fouilles, 1996), 118.

Barley Studio were conserving the figure of Christ being lowered from the cross in window sII 2a. (Fig. 63)

In this depiction of Christ being lowered from the cross, there was found one piece of glass on which was painted the lower legs and feet of Christ and the lower right arm and hand. On the exterior side of this piece there were painted sketchy outlines of the painted detail found on the internal surface. The painted outlines are very fine and in places applied as parallel lines, which correspond to the full width of the trace lines painted between the fingers and toes. In addition, indications for the positioning of the three wounds and where heavy stipple work modelling is to be applied at the turn of the ankle are also included alongside the main trace lines. (Fig. 65)

It is now apparent that once the pieces of glass were cut to shape, they were laid over the cartoon drawing and then the primary details of the painting were applied. The pieces (assuming that the cartoon was not drawn as a reverse image of the final depiction) would then have been turned over and the outlines copied to the reverse side of the glass. The inner outline would then be rubbed out before undertaking the painting procedure described earlier. Finally, prior to firing the pigments in the kiln the outer sketch outlines were rubbed out. Thanks to human error, the piece depicting Christ being lowered from the cross did not have these outlines removed, allowing evidence of their painting techniques to be revealed.

During the conservation works Barley Studio only found one other piece with these outer sketch outlines surviving. This was on the side of the blue throne of King Solomon in window nV light d. (Fig. 65) Here the sketched outlines indicated that the inset side panel between the legs and arm of the throne were to be divided into a pattern of four triangles. The painter however did not follow these lines on the final version. This system of glass painting gave the glass painters freedom to adjust the final trace-lines to achieve the maximum effect.

Kilns and Firing

Antonio da Pisa's late 14th-century instructions for building, loading and firing the kiln are given in his treatise. Like earlier writings by Theophilus, Antonio da Pisa's description relates to a single firing chamber kiln. The painted glass pieces were loaded in layers into a single firing chamber and taken up to a temperature high enough to fuse the pigments to the glass. The kiln's fire was then left to slowly burn out so that the fired glass could cool down steadily. Recent experiments with a reconstructed kiln

following Antonio's description discovered that from the time of lighting the fire and the closing of the kiln door, five and a quarter hours elapsed. The kiln was then left to cool overnight.⁸⁶

By the end of the 15th century the technology of kilns appears to have become remarkably advanced. Caen cites an early 16th-century manuscript which not only describes the procedures but includes an excellent sketch of a three chambered kiln. (Fig. 66)⁸⁷ It is probable that the Fairford glazing would have been fired in kilns resembling this advanced type, built of bricks and lined with clay, allowing a continuous process of firing.

For the applied painting and silver stain to become fixed or permanent on the glass it was necessary to heat the glass in the kiln up to a temperature in the region of 680 degrees centigrade. This process required the glass to be heated in gradual stages so that the glass pieces were not subjected to thermal shock. This type of continuous glass firing kiln was designed to preheat the glass from cold in the first chamber, before being taken up to a firing temperature in the central chamber, whilst the right hand chamber was used for the annealing of the glass. This chamber was longer so that the pieces could be moved slowly along the chamber towards its furthest end where they became cool enough to handle.

The kiln chamber beds were lined with crushed chalk, plaster or lime to protect the glass during the firing process. Glass pieces were transferred from chamber to chamber using flat metal spades that also required preheating to prevent any thermal shock being caused to the glass pieces during the moving procedure. Although the chambers would have had doors to retain heat within the chambers, these would have only been opened when the movement of pieces was required. The moment when the glass was removed from the central chamber was when the paint on the glass became vitrified and fused to the glass surface. Experience would have given the glazier knowledge of the time required for the glass to remain in the central fusing chamber. However to ensure the firing was successful, trial pieces were added and removed for inspection prior to moving the pieces to the annealing chamber.⁸⁸

⁸⁶ Claudine Lautier and Dany Sandron, *Antoine de Pise. L'art du vitrail vers 1400* (Paris: Éditions du Comité des Travaux Historiques et Scientifiques, 2008) reviewed by David King, "Antoine de Pise. L'art du vitrail vers 1400," *Vidimus* 44 (Oct 2010). <http://vidimus.org/issues/issue-44/books-2/>

⁸⁷ Caen, *The Production of Stained Glass in The County of Flanders and the Duchy of Brabant*, 288.

⁸⁸ Caen, *The Production of Stained Glass in The County of Flanders and the Duchy of Brabant*, 290.

This was a mass-process form of kiln that increased the amount of glass that could be fired compared with the single chamber kilns used in earlier periods.

Lead, leading, soldering

Following various 19th-century restoration campaigns, the original leading of the Fairford windows has been lost. However, remnants of the original lead survive, where it was technically difficult to remove these from the glazing during re-leading, and evidence is also seen in the tracings by Joyce, which record the sizes of the lead work. Joyce also commented on the difference between the ancient leading and re-leaded areas from the 17th century, stating: ‘considerable proportion of it in every light has been re-leaded in the seventeenth century; the leads of that date being coarse, wide, and flat, and often rudely applied to the edges of the painted glass, so as to obliterate or obscure the outline and form meant to be conveyed; whilst the more ancient lead-work is extremely narrow, almost invariably of a rounded shape, and applied with considerable skill to the outlines, so as not to hide or destroy their form.’⁸⁹

In a tracing taken by Joyce of the apple tree above the figure of Eve in window nV light a, we can see the narrowness of the original leading around the inset apples within the foliage. (Fig. 67)

As well as the inset jewellery that retains original lead, some has survived where it was practically difficult to dismantle, such as where a glass piece is wider than the entrance of the piece into which it has been leaded. (Fig. 68)

By studying surviving sections of original leading, we can conclude that the original Fairford network of leading was produced by the cast method. The method of casting H-section lead calmes developed over centuries, from its origins where reeds were used, hence the names ‘calmes’ or ‘comes’ referring to the Latin *calamus* = reed. By the 14th century, the calmes were being cast into wooden moulds, a method written about in the treatise by Theophilus.⁹⁰ (Fig. 69) Wooden moulds were an efficient method, but required frequent renewal as they burnt away during the pouring of the molten lead.

During the 15th century and certainly by the date of the Fairford glazing, it appears casting methods had developed further and that the calmes were being cast into iron moulds, as they are consistently smoother on their face when compared with 14th-century cast leads, which show signs of being whittled down to the desired form and

⁸⁹ Joyce, *The Fairford Windows*, 46.

⁹⁰ Theophilus, *On Divers Arts*, 67-70.

size.⁹¹ The iron moulds would require pre-heating prior to the initial casting and the calmes produced by this method were more consistent and accurate in profile compared to those produced previously. (Fig. 70) Some were even formed with decorative moulding, such as Barley Studio found in the excavation of a rubbish pit found in the porch of Fotheringhay church, Northamptonshire.

Surviving calmes from Fairford suggest that those used were as commonly found in glazing schemes, having a flat top face to the leaves. They are all predominantly of a profile having a 3/16" face, with 3/16" height, suitable for accepting the glasses that rarely exceeded 1/8" in thickness.

The leading up of the glass pieces would have followed similar processes as used today, where the leads are folded around the pieces following the lines on the cutline. The leads would have been cut with a curved blade, which may also have been combined with a hammer-head top. (Fig. 71)

As the leading up progressed, the work would be held in place with closing nails until complete. The lead nets would then have been soldered together, most probably with cast strands of solder, containing approximately 50% tin and 50% lead. These solder strands were coated in molten tallow, made from sheep fat that acted as a flux that allowed the solder to flow readily between the lead calme joints, when melted by the copper soldering iron tips.

The soldering irons would have had copper tips on rods set within wooden handles. (Fig. 72) Several of these would have been heated in a brazier, so that as the one being used cooled down, it could be replaced in the brazier and a new one taken.

Having soldered both sides it is likely that the leading was waterproofed by brushing a mixture of chalk and linseed oil between the glass and leaves of the lead calmes. Strands of lead calme would also have been soldered to the leading along the line corresponding to the ferramenta support, to act as ties to be twisted around the ferramenta during installation.

⁹¹ Sebastian Strobl, "Lead in Stained Glass Windows: Integral Part or Disposable Commodity?", Cathedral Communications, 2010. http://www.buildingconservation.com/articles/leadstainedglass/lead_stained_glass.htm [accessed 5 May 2016]

PART 2 MAN IN A RED HAT

Introduction

This section investigates the discovery of discreet anomalies within the glazing at Fairford, which leads me to propose that Michel Sittow was the designer of the unique Fairford glazing scheme.

Window sVII, discovery of a hidden monogram

In the south nave aisle at Fairford, there is a set of three windows which depict the Twelve Apostles, with four apostles appearing in each window. Window sVII is the second of these three windows in the south nave aisle. (Fig. 73)

All the Apostles in these windows are depicted standing on pedestals beneath architectural canopies, holding scrolls which contain passages from the creed. When viewing the three sets of apostles, there appears to be little difference in their arrangement. This however, is not the case, for a closer look at the designs of the pedestals indicates that they alternate in design. Some depict an angel behind three recesses, holding a scroll on which is written the apostle's name. The lights flanking the angel depict three recesses with tiled floors, and between these recesses are two canopy niches which contain standing grotesques who are holding scrolls and dressed in gowns with cowls. (Fig. 74)

An exception to this repetitive sequence appears in the pedestal beneath St. Thomas, in the first light of window sVII, where the same architectural design has been used for the pedestals with figures set in the canopy niches. However in this instance the grotesques are absent and have been replaced by central pillars. The central recess also differs in this light, as there is a minute apse chapel depicted with three windows; at the end wall there is a raised altar on a foot step, which is vested and above it is an open triptych on which is painted the rood. (Figs. 75, 76)

This minute detail was admired by the Reverend Joyce, who was captivated with it. In his footnotes beneath the description of the pedestals he states 'it can hardly admit of doubt that it is in such characteristic efforts of playful skill as these, in which the hand and fancy of the artist had uncontrolled freedom (apart from the almost inflexible canons observable in the design and arrangement of sacred subjects), that is a clue is to be found, if anywhere, to the actual authorship of this glass'.⁹² To discover more clues

⁹² Joyce, *The Fairford Windows*, 94 fn 265.

about the authorship of the glass, Joyce visited the British Museum to view the etchings of the early masters. Only one unknown artist, now known as Master W & key, who signed his works with a 'W A', with a small cross suspended from the bar of the A, possessed the similarities that he was looking for. He cited one etching in particular, which was catalogued as a "Design for the side of a chapel with three windows". (Fig. 77)

Why was this different pedestal design inserted within the set of three four-light windows that depict the twelve Apostles?

Its position, within the first light of the second window of the series, happens to be at the easternmost point in the south nave aisle. It could have been located here as a devotional detail, or as part of a chantry chapel. However, I feel that this is unlikely, as this light is adjacent to the wall of the central tower, and a chantry chapel sited beneath it would restrict movement to the east end of the church. What is more probable is that this pedestal design was deliberately different, so that attention was drawn to this light, above the others. This theory is supported by the discovery of another unusual feature within the light. The backdrop behind the figure of St. Philip is a curtain which hangs from a braided strip at a shoulder-high position. This curtain design is used as a background for all of the Apostle figures, although the curtains have been decorated below the braided strip with a pomegranate pattern, in differing colours. However, in the top left-hand corner of the braided strip behind St Philip, a piece has been discovered that does not include the full pattern. Instead the central strip of this piece has been decorated with a letter 'A', displayed upside down. (Fig. 78)

This is not the first discovery of the letter A within the glazing at Fairford, and it has been suggested that this A monogram relates to the designer responsible for the Fairford glazing scheme. A visit to Fairford by the British Archaeological Association in the summer of 1868 led to the discovery of this letter A, set sideways on the sword blade of the executioner in the Judgement of David window, arousing a great debate. (Fig. 79)

In a letter to the Times newspaper, published 13th August 1868, H.F. Holt suggested that the authorship of the Fairford windows were the hand of the acclaimed Albrecht Dürer and provided a series of suggestions to support his claim. Holt's letter spawned a flurry of letters from learned scholars either supporting or discounting Holt's claim. The claim was eventually discounted and logically dismissed in Reverend Joyce's book of 1872, in

which he identifies the distinctly English and Flemish styles of composition.⁹³ However, this event tells us two things; firstly that the A on the sword blade was commonly believed to be a monogram, and secondly that the windows were of such a high quality that they were originally regarded as the work of Albrecht Dürer.

There is one more oddity about the positioning of the pedestal and the letter A in this easternmost light at Fairford, as immediately above the easternmost eyelet tracery there is a thistle painted. Like the pedestal, this is the only difference in the set of three windows, as the five other tracery sections of this shape are painted with the feathers of the Prince of Wales. (Figs 80, 81)

I cannot help but think that the positioning of these three anomalies provides a clue to the authorship and date of the windows. The unique pedestal, although having similarities to the other designs, is evidently different to draw our attention to this light. The hidden monogram of the letter A will be considered later. The thistle tracery, however, could possibly indicate a date for the glazing.

The year 1503 was significant in the reign of Henry VII as it was when his eldest daughter Margaret had her marriage completed by proxy, on 25 January 1503, at Richmond Palace to James I, King of Scotland. The actual marriage took place on 8th August later that year.⁹⁴ It is therefore quite possible that the thistle tracery was inserted into the window to signify this event.

Another significant event also took place in this year, the death of Arthur, Prince of Wales which had rendered Princess Catherine of Aragon a widow. This was not an ideal situation and required the Spanish and English courts to negotiate a new marriage arrangement. The result of these negotiations was a proposal of marriage between Catherine and Henry VII's second son, Henry, Prince of Wales, the future Henry VIII. On 23 June 1503, a treaty was signed for their marriage, and they were betrothed two days later.⁹⁵ The presence of the Prince of Wales feathers with the motto "Ich Dene", in the other five outer tracteries, could therefore have been inserted to celebrate and mark the occasion of the betrothal of Henry and Catherine in 1503. A depiction of similar heraldic devices celebrating Henry and Catherine's betrothal occurs in the roof bosses of the high vault above the presbytery of Winchester Cathedral, commissioned by

⁹³ Joyce, *The Fairford Windows*, 119-125.

⁹⁴ The Encyclopaedia Britannica (Cambridge: University Press, 1911), 701.

⁹⁵ J.J. Scarisbrick *Henry VIII* (New Haven and London: Yale University Press, 1997), 8.

Bishop Richard Fox; here again the use of the Prince of Wales feathers has proved useful in dating the construction.⁹⁶

Within the Fairford glazing the thistle and Prince of Wales feathers appear again, but their present locations are problematic, as they have not been found in-situ, but are arranged amongst a jumble of fragments set in the main lights after earlier repairs. These repairs were made following a devastating storm in November 1703, which destroyed a great deal of the three west-end windows.⁹⁷

Four of the Prince of Wales feathers have now been reset in the Judgement of David window sX, as two pairs, with the thistle to the outer edges. These tracery shapes are of a slightly larger dimension than those of the other windows in the church, which suggests that they were originally set in one of the flanking Judgement windows (sX or nX). Two more thistle traceries are set in window nII above the second and fourth lights. These have been trimmed down to fit the size of the tracery opening and I would suggest that these were also originally located within one of the Judgement windows, sX or nX. (Fig. 82)

To have both the thistle and Prince of Wales feather traceries placed within the windows, sX and nX, that depict the Judgements of King Solomon and King David seems appropriate. Both depict the judgement of kings, and so would be a logical place to set the Prince of Wales feathers, also linking to the date of royal marriage plans for Henry VII's second son Henry.

The Fairford glazing scheme also provides additional curiosities, which may provide some clue as to the authorship of the windows. The arrangement of figurative groups found in the Fairford glazing scheme have been positioned to be opposite each other. The four Latin Doctors of the faith on the south wall face the four Evangelists on the north, likewise the Apostles face the Prophets and the Champions of the Faith (the Saints and Martyrs) in the south clerestory confront the Persecutors of the Faith in the north. Due to this use of opposites, I have looked for possible differences in the series of Prophets, similar to those found in the St. Thomas light. However, the only difference I was able to find was in the canopy head above the figure of Hosea, now in the fourth light of window nVII (Fig. 83). Here the canopy head differs from all of the others

⁹⁶ John Crook, "Witness From On High," *History Matters*, 2015, accessed 14 May 2016, <http://www.historytoday.com/john-crook/witness-high>.

⁹⁷ Keith Barley, "Conservation and Restoration," in *Fairford Parish Church: A Medieval Church and its Stained Glass*, ed. Sarah Brown and Lindsay MacDonald (Stroud: Sutton Publishing, 2007), 114.

found in the Prophet series, but matches the design of the canopy head above St Thomas in (sVII, light a). It is important to note however that the Prophet series may have been rearranged and the present location of the Prophets may not be the original order.

It is possible that the figure of Hosea (nVIII, light d) was originally set opposite St Thomas (sVII, light a) as another attempt to draw attention to the easternmost line of glazing in the nave. For if we follow this line and look upward to the clerestory level, at the easternmost Persecutor of the Faith, in the third light of window NII, which sits directly opposite the light containing St Philip, we find a figure who raises great curiosity. (Fig. 84)

Within the four north clerestory windows are depicted twelve Persecutors of the Faith. Some are identifiable by either their actions or attributes, such as Herod the Great in window NIV 1c where he is depicted holding a child in his left hand with a sword in his right hand, piercing the child from above. Others are identifiable by the addition of lettering set on various parts of their clothing, such as cuffs and hems. The lettering is often incomplete and the viewer is left to fill in the gaps, as letters vanish to the non-viewable side of the costume. In window NV, depicting Annas in 1a, Judas in 1b (Fig. 85) and Caiaphas in 1c, (Fig. 86) the lettering is easily decipherable. On the green hem of the coat of Annas reading from left are the letters: ANNA: ANNAS: ANNA. From the neck to the chest, written diagonally across the undergarment of Judas are the letters: IV: DAS; on the border of the tunic of Caiaphas are the letters: UFAS, the preceding letters to the left being a newly painted restoration piece. It is noticeable that the letter A is often drawn in the same form as discovered in windows sVII and sX.

Returning to the easternmost Persecutor in window NII, we find an abundance of lettering set in diagonal bands across his costume. (Fig. 87) Joyce comments that the inscriptions have not been deciphered.⁹⁸ Wayment reads the letters: PAI: ONERONDEP: PMOLAM: and comments “among the otherwise meaningless letters running across the back of the figure in 1c the word Nero catches the eye, and must be meant to do so.”⁹⁹ Wayment suggests that the sainted head is that of St. Paul and identifies the figure as Nero. Wayment’s attribution is difficult to comprehend, however, as the decapitated head of the nimbed saint is of a young man with a full head of hair, by which the head is held, whereas elsewhere in the Fairford tracery lights, St. Paul is shown as either bald, as in window sVIII, B4, or balding. The persecutor is also

⁹⁸ Joyce, *The Fairford Windows*, 112.

⁹⁹ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 83.

depicted with long shoulder-length flowing hair and wearing a crown upon a turban band, which is most unusual. Looking at Roman emperors depicted in art of the late 15th century, I have not found any that are bearded. Most depictions represent clean shaven figures similar to the one found in Dirk Bout's *The Justice of Emperor Otto III*. (c. 1470) in the *Musées Royaux des Beaux-Arts*, Brussels. Due to these discrepancies, it appears unlikely that the figure is Nero, raising the question, what does the lettering set across the bands actually mean?

In contrast to all the other letter 'A's used in these inscriptions, the A in the lower band is shown with a V bar that extends beyond the right leg of the A. (Fig. 88) Not only is the A different from the one used in the top band of inscription, but also the M that follows it. This M has an angular form and is distinctly different to the rounded form of the M before the OL, which would suggest that the AM is possibly the most explicit example of a monogram used by the designer of the Fairford glazing scheme.

Moreover, it may be that this AM is the monogram of an artist known to us today as Michel Sittow. At the time of the window's creation and whilst still in the employment of the Spanish Court, he was known and documented as Melchior Alemán ("the German").¹⁰⁰

The A in its simpler form, as found on the executioner's sword in window sX or hidden upside down in window sVII, (see Figs 78, 79) could be interpreted as the A for Alemán, whilst the V shaped bar to the A, together with the lower legs of the A, form M for Melchior. This A letter form, with an extended V bar, found in the lower band of inscription in window NII (Fig. 88) could possibly be deciphered to indicate the letters that form Sittow's surname, which was commonly spelt ZITTOW during this period of the 15th century (Fig. 89).

Whatever the deciphering or interpretation of the inscriptions in this figure may be, I feel that they are significant due to their abundance in number, the positions in which they are found, the way the letters are displayed in differing forms and the fact that the figure is directly opposite, though higher than, the St. Thomas figure in window sVII.

Another variation of this monogram is found on the collar of the foot soldier overseeing the Crucifixion scene, in the upper tier of the east window (Fig. 90). This figure aroused

¹⁰⁰ Rafael D. Casas, "The Artistic Patronage of Isabel Catholic: Medieval or Modern?" in *Queen Isabel I of Castile, Power, Patronage, Persona*, ed. Barbara F. Weissberger (Woodbridge: Tamesis, 2008), 140.

the curiosity of Joyce, who observed that ‘it might be possible that this foot-soldier is the representation of a real person, and that the inscriptions are his name and motto.’¹⁰¹ (Fig. 91) In his footnote Joyce comments ‘The true interest attaching to the inscriptions on this foot-soldier in the glass would be a hope ... that the name might be the signature and the figure the intended portrait of the designer of the window, who took the opportunity to leave thus a record of himself in his work, as artists not unfrequently did at that period.’¹⁰²

Wayment later argued that the figure could represent Sir John Savile, who was at court ‘a knight of the king’s body’.¹⁰³ Wayment suggests that Savile may have overseen the works at Fairford, as he had connections with the Flemish glaziers in London, during the commissioning of the east window at Thornhill Church, Yorkshire.¹⁰⁴

The scale, prominent positioning and superimposing of these letters draw more attention than the ‘A’s previously discussed. I would propose that the inscription on the collar of the Crucifixion onlooker could be read as MA, for Melchior Alemán. Wayment also sees significance in these letters, consistently referring to the principal designer of the Fairford glazing scheme as Master A.M., throughout his discussion chapter.¹⁰⁵

Wayment also draws parallels with design elements observed at Fairford and design elements found in media elsewhere, suggesting A.M. was a designer possessing a considerable range.¹⁰⁶

If the master A.M. is Melchior Alemán, known to us today as Michel Sittow, we would expect to find parallels in what is known of his surviving works and life. In the next section I will look at this known and unknown genius.

¹⁰¹ Joyce, *The Fairford Windows*, 79.

¹⁰² Joyce, *The Fairford Windows*, 79 fn. 220.

¹⁰³ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 96.

¹⁰⁴ Hilary Wayment, “Sir John Savile, Steward of Wakefield, 1482, d 1505,” *Yorkshire Archaeological Journal* 68 (1996): 181-189.

¹⁰⁵ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 96.

¹⁰⁶ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 91.

Michel Sittow (1469-1525): Life, works and comparative material

In comparison to other artists of the early Renaissance period, relatively little is known about Michel Sittow. From what information is known or presumed, there is evidence to indicate that Sittow may have been the principal designer of the Fairford window glazing scheme.

Michel Sittow's father, Clawes van der Sittow, was a designer, painter and woodcarver of Dutch or German decent, whose wife Margarethe Molnare (Molner) was a daughter of a wealthy Finnish-Swedish merchant. Michel was the eldest of their three children, followed by Clawes and Jasper. They appeared to have been a wealthy family owning several properties in Tallinn (which at that time was known as Reval); the purchase of two houses on Ritterstrasse is registered against their name in 1475 and 1479.¹⁰⁷

Clawes van der Sittow was assessor to the artists' Canute Guild from 1479 until his death in 1482. Works he was known to have been paid for include painting in the Kanuti Guild hall, production of city flags, engravings and most importantly glazing windows.¹⁰⁸

As a child Michel was taught theology and other subjects at the town's Dominican Friary, operated by the theologian Dominicus Sitau, who is presumed to be Michel's uncle. In his youth Michel was trained in artistic practices by his father until the age of fourteen, when his father died.¹⁰⁹

In 1484, between the ages of fifteen and sixteen, Michel left Tallinn to continue his studies in Bruges, northern Europe's main arts centre. It is from Bruges that the Dominican Friary had purchased works of art including an altar by Hans Memling. At this time Bruges was one of the most important Hanseatic trading posts, already famous for its oil paintings and other works of art.¹¹⁰

It may be significant that in 1485, the year following Michel's departure to Bruges, his mother remarried to the glazier and painter Diderick van Katvick.¹¹¹ One could speculate that Diderick van Katvick, prior to this marriage, had links with the Sittow

¹⁰⁷ Mojmir Frinta, "Observation on Michel Sittow," *Artibus et Historiae*, 30(60) (2009): 139.

¹⁰⁸ Frinta, "Observation on Michel Sittow," 141.

¹⁰⁹ Johan Maiste, "A Genius and his Myth: The Known and Unknown Michel Sittow," *Baltic Journal of Art History*, 9 (2015): 189.

¹¹⁰ Margrit Schulte Beerbühl, "Networks of the Hanseatic League" European History Online, 2012, accessed 7 May 2016, <http://www.ieg-ego.eu/schultebeerbuehlm-2011-en>.

¹¹¹ Anu Mänd, "Memoria and Sacral Art in Late Medieval Livonia" in *Images and Objects in Ritual Practices in Medieval and Early Modern Northern and Central Europe*, ed. Krista Kodres and Anu Mänd (Newcastle upon Tyne: Cambridge Scholars Publishing, 2013), 257.

workshop. Could he have been the glazier who manufactured the windows designed by Michel's father? If so, had Michel acquired knowledge of the processes involved in creating stained glass from his father and stepfather?

On arriving in Bruges, it is believed that Michel may have joined the workshop of Hans Memling to continue his training, as his attributed works follow the acquired respectable tradition of the earlier masters such as Rogier van der Weyden and Jan van Eyck, as well as techniques used by Memling.¹¹² Michel would have completed his training in 1488, but this is not registered in the Bruges records, perhaps because the early years of apprenticeship were undertaken with his father.

However if we consider that Michel Sittow was perhaps the author of the Fairford windows and trained with Memling, we would expect to see similarities and traits of his master in the Fairford designs. Joyce found such similarities in the upper tier of Fairford's east window (Fig. 92), which depicts the Crucifixion, in comparison to a painting then in the possession of the Rev. J Fuller Russel. He states 'In a picture attributed to Memling, the arrangement is similar to that in this light; two men together piercing the side of Jesus, and a third (who points upward on the left side of the cross) uttering the words of this scroll which hangs over his head.'¹¹³ This painting, the Diptych of Jeanne of France, is now attributed to the workshop of Rogier van der Weyden, (Fig. 93) although Memling's Crucifixion in the Museum of Fine Arts (Fig. 94) depicts a similar composition.

Both Joyce and Wayment comment on the similarity between the famous Memling Gdańsk Last Judgement triptych (Fig. 95) and Fairford's west window (Fig. 96). Joyce compares the figures of St. Michael weighing the souls, stating that the figure in the Gdańsk triptych "resembles this [Fairford] figure in a striking manner. In posture and general arrangement there are several points of likeness."¹¹⁴

Wayment comments that 'Memling was evidently a major influence, especially in the axial windows. His Panorama of the Passion (c.1470) almost certainly contributed to the Christ before Pilate and probably to other pre-Crucifixion scenes.'¹¹⁵ Wayment agrees with Joyce, making the same comparisons between Memling's Gdańsk Last Judgement and Fairford's great west Last Judgement window.

¹¹² Endel Kõks, "Michel Sittow: A painter from Tallinn," *Journal of Baltic Studies* 9:1 (1978), 33-35; Frinta, "Observation on Michel Sittow," 141, 147.

¹¹³ Joyce, *The Fairford Windows*, 81.

¹¹⁴ Joyce, *The Fairford Windows*, 116 fn 329.

¹¹⁵ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 86.

I agree with the observations of Joyce and Wayment and have found several other works attributed to Memling that are either in style, pose or composition similar to those depicted in the windows of Fairford church. What I have also found in other scenes is that most of the similarities between works attributed to Memling and those depicted in the Fairford designs are in reverse, flipped horizontally.

The Memling Nativity now in the Museum für Angewandte Kunst (Cologne, Germany) is such an example, although at Fairford it appears that the designer had to elongate his designs to fit within the tall and narrow lights, but the poses are very similar in the figures of the Virgin and Joseph. (Fig. 97)

I would suggest that the figure of Eve, offering the apple to the serpent in the tree, depicted window nV, light (a) at Fairford has similarities to the figure of Eve attributed to Memling in the outer right panel of a triptych c. 1485 in the Kunsthistorisches Museum, Vienna. (Fig. 98) The broad hips, the buttock-length hair, the stance, the facial features, the fig-leaf form and the pose, although from a slightly differing angle, are very similar. Considering that the Fairford Eve is monumental, compared with the small-scale Vienna Eve, it is possible that both were drawn from the same master drawing. (Figs 98 – 100)

Little is known of Michel Sittow's career between the completion of his training with Memling in 1488, and his appointment as court painter to Queen Isabella the Catholic and Ferdinand of Spain in 1492. No records have been found to enlighten us, but it is assumed that he followed in the footsteps of other artists such as Rogier van der Weyden and travelled to Italy. But what could have occupied his life at this time? As was customary, on completing his apprenticeship, Michel would have become a journeyman and may have continued with Memling or joined another workshop in Bruges.¹¹⁶

It has been suggested that Michel joined a workshop known as the Master of the St. Lucy Legend.¹¹⁷ Looking closely at works attributed to Sittow there are many similarities between his designs and designs attributed to this master. If we compare the painting by the Master of the Legend of St. Lucy depicting Mary, Queen of Heaven, c. 1480 - c. 1510, in The National Gallery of Art, Washington DC; it has many similarities

¹¹⁶ S. R. Epstein, "Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe," *Journal of Economic History* 58 no. 3 (1998): 692-693.

¹¹⁷ Köks, "Michel Sittow: A painter from Tallinn," 33-34.

in design and composition to that of Sittow's Assumption of Mary in the same gallery. (Fig. 101)

In 1492 Sittow was appointed as court painter to Queen Isabella and Ferdinand of Spain, joining an assemblage of scholars, scientists and workers in the arts from various nationalities, as had become customary in the royal courts of Europe. The Spanish Court was constantly on the move at this time, travelling to Toledo, Avila, Barcelona, Madrid, Seville, Burgos, Granada and other Spanish cities. What is known of this period is that an assistant for Sittow was employed in 1496, as there is a mention in the accounts of a Fleming, Juan de Flandes. At a later date a new addition to the team, identified by Matthias Weniger as Felipe Morros originating from northern France, is also mentioned.¹¹⁸ What this indicates is that the demand for works of art from Sittow, by Queen Isabella of Castile, had exceeded his capacity and so Juan de Flandes and Felipe Morros were also employed to assist with the production of paintings.

The most impressive set of works produced by Queen Isabella's court painters are the set of small-scale individual panels for a Retable, measuring around 21 cm high by 15 cm wide. Of the 47 originally planned, 27 have survived; those that survive principally depict the lives of Christ and the Virgin Mary.¹¹⁹

It is puzzling that the vast majority of paintings identified from court painters, notably from this Retable, are attributed to the hand of Juan de Flandes. It may be that this is due to the hierarchy of court painters. There are two types of artists, those who are technically competent, capable of copying and trained in the use of materials and the techniques of application, but lacking in aptitude when asked to design. The other type, like Sittow and his contemporary Albert Dürer, not only possess technical abilities, but also the genius of design. Sittow's talent was evidently recognised, as he was being paid 50,000.00 maravedis a year, whereas Juan de Flandes was only being paid 20,000.00 maravedis a year.¹²⁰ It could be suggested that the majority of Sittow's time was spent designing and creating cartoons and underdrawings for others to use when producing the final work of art. This would help to explain the dearth of works that are firmly attributed to the hand of Sittow. Chiyo Ishikawa's study of the Retable panels highlights the differences between the underdrawings of the panels produced by Juan de Flandes and those produced by Sittow. Juan de Flandes' underdrawings were bold in

¹¹⁸ Matthias Weniger, *Sittow, Morros, Juan de Flandes, Drei Maler aus dem Norden am Hof Isabellas von Kastilien* (Kiel: Verlag Ludwig, 2011), 17-18.

¹¹⁹ Ishikawa, *The Retablo de Isabel la Catolica by Juan de Flandes and Michel Sittow* 1, 5.

¹²⁰ Rafael D. Casas, "The Artistic Patronage of Isabel the Catholic: Medieval or Modern?", 140.

comparison to those of Sittow. Under infrared reflectography Sittow's Assumption of the Virgin panel reveals a simply sketched underdrawing, whereas underdrawings found in panels by Juan de Flandes are more thorough and bolder.¹²¹

Could the thoroughness of Juan de Flandes' underdrawings, revealed on panels by infrared reflectography, indicate that they were originally set out by Sittow, so that Juan de Flandes could then paint the designed drawings in his style and technique?

The reduced version of the Miraflores Altarpiece by Rogier van der Weyden, now in the Museo de la Capilla Real, Granada, has also been attributed to either Sittow or Juan de Flandes.¹²² (Fig. 102) It is interesting to note that the figure of Christ carrying the cross, depicted in the left recess border, shows Christ with spiked wooden blocks hanging from his waist which were intended to increase his suffering on the road to Calvary; a feature that was also included in Fairford's depiction of Christ carrying the Cross. (Fig. 103) Could Sittow have used this unusual detail again, having seen it in the earlier work?

As it appears that Sittow was the principal court painter, he would have been the main designer for works of art requested by Queen Isabella. Therefore some clues about his design features should be found in the paintings produced by his assistants and himself, during his period of service under Queen Isabella from his appointment in 1492, until her death in 1505. The Spanish court was constantly on the move during this period; therefore if a work of art was desired in a medium which required the use of an equipped workshop our attention needs to be diverted elsewhere. Instead we need to consider works of art that were not produced in Spain, but in centres known for their excellence in skilled craftwork, such as Flanders, where the weaving of tapestries and the production of stained glass were well known, or Limoges which was famous for its enamelled work. In Sittow, Queen Isabella had in her employment an artist capable of designing and producing cartoons like the celebrated contemporary artists, Albrecht Dürer and Bernard van Orley, who were known to have produced designs for stained glass and tapestries.¹²³ If we look at the paintings known to have been produced by

¹²¹ Chiyo Ishikawa, *The Retablo de Isabel la Catolica by Juan de Flandes and Michel Sittow* (Turnhout: Brepols, 2004), 159.

¹²² Frinta, "Observation on Michel Sittow," 146; "Sittow, Michel: Pietà," Web Gallery of Art, n.d., accessed 18 May 2016, http://www.wga.hu/html_m/s/sittow/pieta.html.

¹²³ Fritz Koreny, "Albrecht Dürer or Hans Schäufelein? The 'Benedict Master' reconsidered," paper given at British Museum conference 2003, accessed 14 May 2016, <https://www.britishmuseum.org/pdf/5%20Albrecht%20Durer%20or%20Hans%20Schaufelein.pdf>; Maryan W. Ainsworth, "Michiel Coxie, Leuven," *The Burlington Magazine*, CLVI (March 2014): 190.

Sittow and his assistants, and also at other works of art from different media, we may find similarities in design to the Fairford glazing scheme.

If we look for features of design that occur in both the Fairford windows and these panels, we find the use of flying birds to create distance in the perspective of scenes. Birds are found in panels attributed to Juan de Flandes in scenes that depict Christ Calming the Storm on the Sea, Last Supper, Entry into Jerusalem, Christ before Pilate, Christ and the Women of Samaria, Descent into Limbo, Supper at Emmaus, Miracle of the Loaves and Fishes, Nailing to the Cross, Temptation of Christ, Three Marys at the Tomb and Raising of Lazarus. At Fairford, birds appear in many of the scenes set outside including Moses and the Burning Bush, Gideon and the Fleece, Deposition of Christ, the Transfiguration and the Miraculous Drought of Fishes. (Fig. 104)

Another similarity is found with the cross nimbus of Christ, which takes the form of an elongated fleur-de-lys. The nimbus is rarely used in the depictions of Christ on the Juan de Flandes panels, but does appear in the depiction of Christ's Entry into Jerusalem and the Last Supper. At Fairford this form of cross nimbus appears frequently in most of the depictions of Christ. (Fig. 105) This cross nimbus form is not exclusive to these works however and was also used by some of the other artists working in this period.

The drawing of people in crowds or large groups is treated in a similar manner, both at Fairford and in the panels attributed to Juan de Flandes. The method used to depict this subject matter was to join the crowns of heads in the crowd or group, to form a rhythm of semicircles. In the panels attributed to Juan de Flandes, this treatment of crowds or large groups is seen in scenes depicting the Entry to Jerusalem, Christ Appearing to his Mother and the Saved of the Old Testament, Christ and the Issue of Blood, Descent into Limbo, Descent of the Holy Spirit, Miracle of the Loaves and Fishes, Nailing to the Cross and Raising of Lazarus. At Fairford the group found in the Incredulity of St. Thomas are treated similarly, as are facial expressions of elders, who are portrayed with flattened elongated noses and drooping expressions. (Fig. 106)

The panels also provide additional significance in regards to an inscription found on the opened tomb lid of Lazarus, in the Raising of Lazarus panel. (Fig. 107) This tomb lid has the word LASARA inscribed upon it; the A appears three times and is centrally set at the base of the depiction. The form of the letter A in this panel is the same as the form discovered in the Fairford glazing. (Fig. 108) It is interesting to note that a later depiction of the same subject (now in the Prado Museum) largely borrowed from the

earlier painting; however in this version Juan de Flandes did not include the inscription LAZARA on the tomb lid. Also in the lower frame border of the painting the letter A has a straight cross bar, as opposed to the V bar through the A as seen in the earlier painting (and in the Fairford windows). (Fig. 109) This suggests that when Juan de Flandes originally painted the Raising of Lazarus scene on the panels, he had to follow the underdrawing designs provided by Sittow; hence we see the appearance of inscriptions in the scene with the letter A and its V bar. The lack of inscriptions on the tomb lid in the later Raising of Lazarus scene painted by Juan de Flandes, as well as the letter A being used with a straight cross bar, adds to this argument. When Juan de Flandes recreated this scene at a later date he was no longer in the employment of Queen Isabella's court. If the inscription styling in the previous panel version was indeed Sittow's work, there is no reason why Juan de Flandes would want to include this in a piece of work he had been commissioned to produce, as in effect he would be crediting a different artist as the creator of his own piece of art work.

Another occurrence in the panel that depicts the Raising of Lazarus is the possible inclusion of a hidden portrait, suggested to be of Maria, the youngest daughter of Queen Isabella and Ferdinand, overlooking the scene.¹²⁴ The inclusion of hidden portraits occurs throughout the series of panels, that of Queen Isabella in the Miracle of the Loaves and Fishes as well as other examples cited by Chiyo Ishikawa.¹²⁵ At Fairford the situation is no different, where the inclusion of portraits or likenesses occurs frequently within the glazing scheme.

There are several other similarities in design, which may be considered common to other works by artists of this time, but if we look at the compositions of the same subjects or associated scenes within the Fairford scheme we can draw comparisons with the panels. The architecture of Fairford church resulted in tall and narrow main lights, which inevitably had an impact on the designer's compositions, which appear to have been stretched to fill the openings; nevertheless comparisons can still be made.

The scenes of the Entry into Jerusalem are comparable in composition, with Christ's cross nimbus, hand raised in blessing, and a spectator suspended in the branches of a tree. (Fig. 110)

¹²⁴ Chiyo Ishikawa, *The Retablo de Isabel la Catolica by Juan de Flandes and Michel Sittow*, 152.

¹²⁵ Chiyo Ishikawa, *The Retablo de Isabel la Catolica by Juan de Flandes and Michel Sittow*, 139, 92, 152.

The most comparable examples between the panels produced for Queen Isabella and the windows at Fairford can be seen in the central openings of Fairford's east wall chapels, the Lady Chapel on the north side and the Corpus Christi Chapel on the south side. In each of these chapels the central depiction set in the light above their respective altar relates to the chapel, but interrupts the narrative sequence of the glazing scheme. The Corpus Christi Chapel light depicts the Transfiguration and compares well with the panel attributed to Juan de Flandes. (Figs 111 – 113)

It should be noted that the head of the Transfigured Christ is a restoration by Barley Studio based on a sketch held in the British Museum of the original piece which had been defaced, probably abraded away at the height of the Reformation.¹²⁶ This and the destroyed heads of Christ and the two thieves in the Crucifixion depicted in the upper tier of the east window are the only examples, at Fairford, of the wrath of Puritanism. Despite the loss of the original head of Christ, the pose of the figure is comparable with the Juan de Flandes version. (Fig. 113)

The Lady Chapel at Fairford has a similar five-light window, where the Assumption and Coronation of the Virgin Mary is depicted in the central light, flanked by the Rest on the Flight to Egypt and Christ disputing with the Doctors in the Temple. (Fig. 114) The monumental central image of Fairford's Assumption of Mary and the miniature panel painting by Sittow of the same subject (Fig. 115) deserve comparison. (Fig. 116) The pose and arrangement of the Virgin Mary and accompanying angels are similar in style. Even the fall and folds of the angels' drapery are drawn in a similar manner, as is the gown of the Virgin Mary which extends over or behind the crescent moon. The lower section of Sittow's Assumption is seen as his only known painting of a landscape; however such scenes are frequent inclusions within the Fairford narrative windows.

Due to the difference in canvas size it is hard to make comparisons in composition between Fairford's Ascension and Sittow's; however, Sittow's figures are leaning on one knee as is the figure in the foreground of the Fairford image. (Fig. 117)

The Descent into Limbo painting attributed to Juan de Flandes warrants comparison with Fairford's Harrowing of Hell, especially when looking at the lower torso of Adam as he emerges from Limbo. (Fig. 118) The upper section, above the bar, includes the heads of Christ, Adam and Eve; this panel was restored by Barley Studio.

¹²⁶ Barley, "Conservation and Restoration," 113.

Juan de Flandes' painting of the Supper at Emmaus (Fig. 119) has in the border of the cloth covering the bench, an inscription with an unusual feature, where the letter N appears twice and is written in reverse. The first instance follows the letters EH in the left-hand corner and the second instance is found in the word AMEN. The use of this reversed N also appears in a painting attributed to Juan de Flandes (currently housed in the Metropolitan Museum of Art) depicting St. Michael and St. Francis, where the N in the word SAINT beneath St. Michael is reversed.

Another work with stylistic and compositional parallels can be found in a triptych by an unknown artist in Lisbon's National Museum of Ancient Art.¹²⁷ (Fig. 120) In the lower-left wing is the scene of the Flagellation on which a seated character is pulling the rope taut around the ankles of Christ. The figure is similar in pose to that used in Juan de Flandes' painting of Nailing Christ to the Cross found in the Kunsthistorisches Museum. (Fig. 121) On the scabbard of this seated figure in the Flagellation scene is the inscription TBOMLEUS ANDLOF, with the N in reverse and the A being of the form found at Fairford. (Fig. 122)

This triptych is also comparable to several of the design features found in the Fairford glazing scheme. The cross nimbus style is similar, as is the movement of the figures, and facial expressions which have open mouths baring teeth. (Fig. 123)

The composition, poses and setting of the images depicting Christ before Pilate in Fairford's east window and those in the triptych are comparable. (Fig. 124) The seated Pilate with his arms set to the side, for his hands to be washed by a youth pouring water from a vessel, whilst his eyes are transfixed on a downward looking Christ. The soldiers with their spears and onlookers are all anxious to hear the verdict, creating the same mood and emotion in both depictions.

The scenes depicting the Flagellation of Christ at Fairford and in the Lisbon triptych are again stylistically similar in composition. (Fig. 125) The pose of the persecutor dressed in green, with raised arm behind the pillar on which Christ is bound, is remarkably similar in both depictions. The cross nimbus, the folding of the loincloth, the pose and expression of Christ are also comparable. The lean to the right of Fairford's Christ is one of many examples where the designer has adjusted the positioning of faces to avoid

¹²⁷ Lisbon, Museu Nacional de Arte Antiga, Inv. 772&882-885, accessed 13 May 2016, <http://www.museudearteantiga.pt/english>.

any disruption caused by the shadow cast from the vertical stanchion which was set centrally in each light.

These stylistic comparisons made between works attributed to Juan de Flandes, their compositions, the reversed N and the type of A found in Fairford's glazing, suggests that there were links with the designer of both the Lisbon triptych and Fairford's windows.

A comparison can also be made between a Bible illustration attributed to Sittow's assistant Felipe Morros and the design of Fairford's depiction of Christ disputing with the doctors in the temple.¹²⁸ (Figs 126, 127)

Amongst other comparative work there is an interesting Limoges enamel attributed to Penicaud, now found in the Museo de Bellas Artes de Granada, which has comparable design features to those found in the Fairford glazing scheme.¹²⁹ (Fig. 128) The enamel is a triptych on two tiers; on the lower row it depicts Christ carrying the Cross, the Crucifixion and the Deposition of Christ. The upper tier depicts the Last Judgement on the left side, with St. Peter leading the saved to the steps of Heavenly Jerusalem; the centre depicts Christ in Judgement enthroned on a rainbow, flanked by the Virgin Mary with the Lily to his left and St. John the Baptist with the sword to his right, below Christ, the dead are depicted rising from their graves heralded by trumpeting angels; the final scene on the right depicts the doomed being led to the jaws of Hell by demons. This triptych is reputed to have been the travelling altarpiece used by El Gran Capitan (The Great Captain), Gonzalo de Córdoba, Duke of Terranova and Santangelo, Andria, Montalto and Sessa. Gonzalo de Córdoba earned his nickname from two successful military campaigns in Italy and the siege of Granada. Gonzalo de Córdoba was favoured by Queen Isabella and married one of her maids in waiting, Luisa Manrique de Lara, on 14th February 1489.¹³⁰

This small-scale triptych has so many design concepts and similarities that are also found within the works at Fairford, that I cannot refrain from suggesting that this Limoges enamel was designed by Queen Isabella's court painter Michel Sittow and produced by Penicaud. For example, the depiction of St. Peter leading the saved to the

¹²⁸ Weniger, *Sittow, Morros, Juan de Flandes*, 446.

¹²⁹ Granada, Museo de Bellas Artes, Inv. CE0001, accessed 13 May 2016, <http://www.juntadeandalucia.es/cultura/WEBDomus/fichaCompleta.do?ninv=CE0001&volver=busquedaAvanzada&k=&lng=es>.

¹³⁰ "Gonzalo Fernández de Córdoba," last modified 24 October 2015, https://en.wikipedia.org/wiki/Gonzalo_Fernández_de_Córdoba.

steps of heavenly Jerusalem (Fig. 129) has similarities with the same image depicted in Fairford's west window. (Fig. 96) In particular, the three angels overhanging the parapet with a musical score make an unusual parallel with the scene of Christ's Entry into Jerusalem at Fairford. (Fig. 130)

The right-hand upper wing of the triptych is even more curious, for here we have images of demons. These images are highly individual, being figments of the designer's imagination. Many comparisons in style can be made with biblical depictions of demons created by late fifteenth- and early sixteenth-century artists, but comparisons of demons show elements in their depictions which are particular to individual artists. For example, Hieronymus Bosch is well known for his characteristically vivid portrayal of demonic images which are often hybrid in composition.¹³¹

The Granada triptych contains images of five demons, four of which have upturned pig-like noses and the fifth has a twisted snout. All five have spiked top hair, two have additional faces either on the forearm or chest and most have spotted bodies.

Fairford has an abundance of demons appearing in all sixteen tracery lights of the north clerestory, the Harrowing of Hell in sII and in the west Last Judgement window. I have found no closer likenesses to the demons depicted in Fairford than those portrayed in the Granada triptych. One small demon in Fairford's westernmost window NV A1 compares well with the uppermost demon in the triptych with its broad square forehead, spiky hair and chubby features. (Fig. 131)

Images of demons appearing within the Fairford glazing scheme and those appearing in the Granada triptych have been selected to demonstrate the similarities between these two works of art. (Fig. 132) The finale of Fairford's Last Judgement window depicts Lucifer in the bottom right-hand corner, with the damned being consumed by his gaping mouth. This depiction also includes an image of a fearsome spiked toothed demon on Lucifer's chest. (Fig. 133) The depiction of the gaping mouth is similar to that in the Granada triptych. (Fig. 129)

Christ enthroned on a rainbow, depicted in the central upper scene of the Granada triptych, corresponds with the one found at Fairford, but on a smaller scale. The globe beneath Christ's feet in the triptych shows an inscription in which the letter A appears five times, taking the same form as discovered in the Fairford glazing. (Fig. 134) In this

¹³¹ Walter S. Gibson, *Hieronymus Bosch* (London: Thames and Hudson, 1973), 57-60.

example, displaying the letter A in the same form as found at Fairford and as on the tomb lid of Lazarus (Fig.108), in the Juan de Flandes depiction in Isabella's Retablo, is significant. As in other works of art possibly designed by Michel Sittow, the letter A is often added in central or prominent positions.

The compositions of the Crucifixion scene in the triptych and at Fairford are comparable with the swooning Mary being comforted by St. John, the assistance of the soldier with the spear, the demon and angel collecting souls of the penitent, the unrepentant thieves and the beaded straps of the horses with their hanging tassels. (Fig. 135) Comparisons can also be made with the dead rising from their graves in the Judgement scenes, with their rectangular graves and scrolls bearing inscriptions. (Fig. 136)

Christ carrying the Cross on the Granada Limoges enamel has similar design features with the Fairford depiction of the same scene. (Fig. 137) In both, Christ is being led by a soldier from a rope tied around his waist whilst another soldier stands with raised right arm brandishing a stick. Both also show that Christ has left the round-topped double recessed arched gateway of Jerusalem, with a shield set above the arch. The cross nimbus is also of the same fleur-de-lys style.

When looking at other Limoges enamels attributed to the Penicaud workshop at this time, it becomes apparent that they were producing enamel works based on various sources, such as contemporary prints or individual designs imagined by different artists as many works, often of the same subject, differ in style.¹³²

It is surprising that despite the difference in scale of the Granada Limoges enamel and Fairford's windows, one being miniature and the other monumental, there are so many similarities in style and composition. This therefore seems to suggest that their design came from the same hand, and one that was technically competent in different media.

Another painting with comparable details to the demons in the Granada Limoges enamel and Fairford windows was sold by Christie's, New York on 29th January 2015, selling for \$32,500, over twice its pre-auction valuation. It is attributed to the circle of

¹³² Susan L. Caroselli, *The Painted Enamels of Limoges* (Los Angeles: Los Angeles County Museum of Art, 1993), 25-28.

Michel Sittow and depicts St. Margaret of Antioch. It is painted in oil and gold, on a small panel, measuring 11¼ x 8¼ inches. (Fig. 138)¹³³

The head of the dragon in this painting has all the hallmarks of the demons found within the Fairford windows and the Granada Limoges enamel with conical ear type, upturned pig-like nose, fanged teeth and spiked upper headline as used on the demons appearing on the dragon. (Fig. 139) The head of St. Margaret in the painting is also stylistically similar to the St. Margaret seen in Fairford's north clerestory window SIII light c and also Sittow's head of the Virgin, from the Virgin and Child painting now in the Museum of Fine Arts, Budapest. All three depictions have jewelled hair bands with common facial features including high upper eyelids, rounded eyebrows, bulbous bottom lips, pointed chins, broad foreheads and a slight indication of a double chin. (Fig. 140) These depictions also have similarities, especially in their melancholic expressions, with other faces attributed to Sittow, that academics have suggested are portraits of Catherine of Aragon.¹³⁴ (Fig. 141)

Another interesting detail of the Christie's, New York panel depicting St. Margaret of Antioch is the inscription on the bottom rail of the frame, which reads SANTA MARGERITA. What stands out is that the A used as the second letter in both words is of the type found concealed within the Fairford glazing depiction of St. Philip in window sVII light a, where the letter A has a V as its bar across. In contrast, the letter A used at the end of each word in the inscription is of a completely different design. Another point of note is that a reversed N is also found in the inscription of SANTA on the Christie's panel. (Fig. 142)

Examples of the reversed N following the letter A can also be found in the art of tapestry. In the Tapestry Museum of the Royal Palace of La Granja de San Ildefonso are a set of nine tapestries depicting the Honours.¹³⁵ (Fig. 143) Although the series was completed in 1523 by the Antwerp weaver, Pieter van Aelst, it was not until 1526 that the tapestries were purchased by Charles I of Spain, when he married Isabella of Portugal. After completing the series in 1523 Pieter van Aelst, due to financial difficulties, was forced to mortgage the tapestries to the agents of the Fugger in

¹³³ "Sale 3709 Lot 227 Circle of Michel Sittow Saint Margaret of Antioch," Christie's The Art People 2015, accessed 3 October 2015, <http://www.christies.com/lotfinder/paintings/circle-of-michel-sittow-saint-margaret-of-5868426-details.aspx>.

¹³⁴ Gustav Glück, "The Henry VII in the National Portrait Gallery," *The Burlington Magazine* vol. 63 no. 366 (1933): 107.

¹³⁵ "Flemish Tapestries in Spain," Grupo Enciclo / Fundación Carlos de Amberes 2013, accessed 2 Oct 2015, [http://www.flandeshispania.org/tapestries/index.php/The_Honours_series_\(Los_Honores\)](http://www.flandeshispania.org/tapestries/index.php/The_Honours_series_(Los_Honores))

Antwerp. Pieter van Aelst suggested to his creditors that they should first offer such a precious tapestry to His Imperial Highness, for whom it had originally been woven. The creditors decided to accept this suggestion, and decided to send as a sample the central piece of the series with the allegory of Honour.¹³⁶ No documentary evidence has been found for the names of the many cartoonists responsible for these works. No preparatory drawings appear to have been kept either; however the series has been attributed to several artists, including Bernard van Orley and Jan Gossaert de Mabuse.¹³⁷

This series of tapestries were a considerable body of work, which would have required looms in excess of five metres in length and a team of up to six skilled weavers to create. As discussed in the techniques and materials section, (page 30) the weavers would have created the tapestry design by following the details presented in cartoons set behind the looms. It has been suggested that these nine tapestries were commissioned, designed and woven within an eighteen-month period,¹³⁸ although this seems unlikely. Comparisons of the nine tapestries indicate differences in figure drawing, style and lettering, suggesting that many cartoonists were involved in the production of the series. This therefore indicates that these tapestries were produced over a longer time period, due to a reliance on the availability of various artists at different times, as their services were required to produce the cartoons for Pieter van Aelst to weave.

I would suggest that the original concept and small-scale designs for this series of tapestries were produced by a talented artist for a notable patron, and the cartoons for weaving were then commissioned. Following this, as can happen, the patron may have cancelled or put the commission on hold. In the hope that this work in progress may eventually find a new client, it appears that van Aelst continued to produce the series amongst other commissioned works. His business decision to find a new client could have taken longer than he expected, and resulted in him facing a large financial outlay for the works in progress; this situation would have necessitated his eventual mortgage of the tapestries to the agents of the Fugger in Antwerp.¹³⁹

¹³⁶ Concha Herrero Carretero, "Renaissance Tapestries from the Patrimonio Nacional" in *Resplendence of the Spanish Monarchy: Renaissance Tapestries and Armor from the Patrimonio Nacional* ed. Antonio Domínguez Ortiz, Concha Herrero Carretero and José A. Godoy (New York: Metropolitan Museum of Art, 1992), 27.

¹³⁷ "Flemish Tapestries in Spain," Grupo Enciclo / Fundación Carlos de Amberes 2013, accessed 2 Oct 2015, [http://www.flandesenhispania.org/tapestries/index.php/The_Honours_series_\(Los_Honores\)](http://www.flandesenhispania.org/tapestries/index.php/The_Honours_series_(Los_Honores))

¹³⁸ Thomas P. Campbell, *Tapestry in the Renaissance: Art and Magnificence* (New York: Metropolitan Museum of Art, 2002), 182.

¹³⁹ Campbell, *Tapestry in the Renaissance*, 181.

Arguments made by Thomas P. Campbell that these tapestries were not made for Carlos I of Spain, as there are no references to him in the imagery, are plausible. He does however propose that they may have been originally commissioned by Margaret of Austria and Maximilian, especially as both appear in the tapestries in the guise of figures depicted.¹⁴⁰

Interestingly Michel Sittow had a period of employment with Margaret of Austria in 1515 -16,¹⁴¹ and therefore it is plausible that he was responsible for designing some of the tapestries in the set, as well as producing some of the initial cartoons, before he left to work in Spain for King Carlos I in 1516. The timeline for the design, production of cartoons and the eventual completion of the nine Honours tapestries would then have taken seven to eight years; a realistic period of time for the production of these types of work.

The suggestion that Sittow may have had some part in the creation of these works arises from titles that indicate the identity of varied historic notables depicted in the tapestries. In the Fame tapestry there are similar design features to those found in the glazing at Fairford. Other than the figure styles and poses, there are four columns flanking the figure of Fame and each of these columns has a griffin supporting a blank shield set upon it. The remaining fourth column has a lion supporting a blank shield set upon it; this is very similar to that found on the left-hand column of King David's throne in the Judgement of David window at Fairford. (Fig. 144)

The portrayal of names to identify the figures depicted is even more curious. The figure of Samson has all the letters shown as a mirror image of his name; here the A and O are not read as being reversed as they are identical in both situations. (Fig. 145) The reversed N has been discussed previously, however in this tapestry the S as a mirror image becomes a Z, possibly as reference to Zittow. Additionally the significant title name FAMA, found centrally above the head of Fortune, possesses 'A's that vary between left and right; with the latter having a Z set as the bar across the A. (Fig. 146)

Other than the media of art already discussed, it appears that Sittow could also have been involved in the design of works of art for the medium of stained glass. As previously mentioned, Sittow's father, Clawes van der Sittow, was known to have

¹⁴⁰ Thomas P. Campbell, *Tapestry in the Renaissance: Art and Magnificence* (New York: Metropolitan Museum of Art, 2002), 182.

¹⁴¹ Burton B. Frederickson, *Catalogue of the Paintings in the J. Paul Getty Museum* (Los Angeles: Getty Publications, 1972), 59.

supplied windows,¹⁴² whilst his stepfather, Diderick van Katwijk, was a glazier who took over Clawes' workshop.¹⁴³ It is probable that Sittow, through his family connections and time spent in Bruges, a centre of stained glass production,¹⁴⁴ would also have produced designs for stained glass. Having looked at examples of extant early Renaissance European stained glass, the only comparative works that I have found resembling the windows at Fairford are found in the windows of the Cartuja de Miraflores, Burgos, Spain.¹⁴⁵ There are many stylistic comparisons between the nave windows of the Cartuja de Miraflores and the windows at Fairford, including hidden portraits, floor tiles and figure compositions.

The Cartuja de Santa Maria de Miraflores was originally founded by John II, King of Castile and León in 1442. Following destruction by fire in 1452 a new complex was designed by German architects, Hans and Simon of Cologne, with construction starting in May 1454. Following several setbacks, the building works stopped and the church remained unfinished until Queen Isabella of Castile re-commissioned the rebuilding works in 1477. The architects collaborated with other renowned artists on the church's interior creating one of the most impressive ensembles of medieval art and architectural ornament to survive in Spain.¹⁴⁶

The vaults of the new church were completed in 1488 and now with a roof, the ornamentation of the building could begin. Queen Isabella commissioned from the Flemish sculptor Gil de Siloam an alabaster tomb of Infante Alfonso. This was a highly decorated monument with an architectural niche framing, a sculptural image of the entombed and the star-shaped mausoleum of her parents, King John II and his second wife Isabella of Portugal.¹⁴⁷ These works were completed somewhere between 1489 and 1493, which suggests that the apse glazing scheme would have been installed at a similar time. The church's main altarpiece, similar to the decoration of the mausoleum, was also executed by Gil de Siloam and the painter Diego de la Cruz between 1496 and

¹⁴² Mojmir Frinta, "Observation on Michel Sittow," 141.

¹⁴³ E.P. Richardson, "Portrait of a Man in a Red Hat by Master Michiel," *Bulletin of the Detroit Institute of Arts* XXXVIII (4) (1958-59): 82.

¹⁴⁴ "The memorial list of Bruges painters," *Flemish Primitives*, 2016, accessed 11 May 2016, <http://vlaamseprimitieven.vlaamsekunstcollectie.be/en/research/webpublications/the-memorial-list-of-bruges-painters>.

¹⁴⁵ "Cartuja de Miraflores," *La Cartuja de Miraflores*, 2015, accessed 2 October 2015, <http://www.cartuja.org>.

¹⁴⁶ "Cartuja de Miraflores," *La Cartuja de Miraflores*, 2015, accessed 2 October 2015, <http://www.cartuja.org>.

¹⁴⁷ "Sepulcro del Infante Alfonso de Castilla," *La Cartuja de Miraflores*, 2015, accessed 2 October 2015, <http://www.cartuja.org/cultura/arte/obras-destacadas>.

1499.¹⁴⁸ This suggests that the building and its glazing was completed in advance of these dates.

Within the choir apse are seven twin-headed single-light windows, of which only three containing stained glass have survived. These depict The Presentation in the Temple, The Coronation of the Virgin and The Adoration of the Magi. (Fig. 147) The other four in the series, probably removed to provide more light for the altarpiece, would have contained scenes from the life of Mary. A further ten three-light windows with traceries survive within the nave. They depict on the north side, proceeding westward, the Crucifixion, Christ Carrying the Cross, the Mocking of Christ, the Flagellation, the Agony in the Garden; and on the south side the Deposition of Christ, the Resurrection, the Ascension, Pentecost and the Last Judgment. Similarities are seen in the design of the choir and nave windows, but the painting styles differ, suggesting that different workshops produced these two sets of windows to designs produced by a master designer.¹⁴⁹

At Fairford most of the narrative scenes are depicted across two lights, with others being confined to a single opening, although the Crucifixion scene crosses over all five of the upper tier lights in the east window. In the windows of the Cartuja de Miraflores the scenes are depicted across three lights in the nave and across twin-headed single openings in the choir apse. Despite the differences in size and proportion of the openings, and the Cartuja de Miraflores being of an earlier date, common design elements appear at both sites. Scenes set within the interiors of ornate buildings have tall pillars supporting vaulted ceilings and use receding diamond patterned windows to create a perspective of distance. The arches of the architectural spaces use flattened semicircles with architectural canopy work. Other windows have canopies with niches and some have standing figures set within them. (Figs 148 – 150)

Caen argues that the commissioning of the windows from craftsmen in Flanders was entrusted by the royal family to Martin de Soria, an influential merchant from Burgos. Martin with his brother Diego traded internationally in wool, linen, iron, olive oil and pigments. Their company had trading stations in Florence, London, Bordeaux and La Rochelle; with their main trading station being centred in Bruges. The company also acted on behalf of the Spanish court for the purchase of luxurious textiles and acted as

¹⁴⁸ “Retablo Mayor de la Iglesia,” La Cartuja de Miraflores, 2015, accessed 2 October 2015, <http://www.cartuja.org/cultura/arte/obras-destacadas>.

¹⁴⁹ Caen, *The Production of Stained Glass in the County of Flanders and the Duchy of Brabant*, 54.

part of the network of couriers carrying messages to Spanish ambassadors. Around 1487 the seven choir apse windows were commissioned, for installation in 1488-9, with the nave windows being commissioned closely after. At the time the choir apse and nave windows were being commissioned Martin de Soria must have visited Bruges to negotiate the contracts.¹⁵⁰

Michel Sittow would at this time have completed his apprenticeship under Hans Memling in Bruges, and would now have been a journeyman in his early twenties. It is tempting to suggest that Sittow was selected by Martin de Soria to design and cartoon the windows for the Cartuja de Miraflores. Queen Isabella would then have seen the windows designed by Sittow, and could have made the connections that resulted in Sittow's appointment as her court painter in 1492. The copy of the Miraflores altarpiece discussed earlier and possibly by Sittow, supports this connection.

The three surviving windows of the choir apse are of particular interest. They, in my opinion, precede those of the nave glazing and display a higher degree of quality in detail. It appears as if these windows were both designed and cartooned by a master artist whereas the nave windows were designed by the same hand, but cartooned by the glazier. The scenes depicted show many similarities to those at Fairford; for example the descending dove within the architectural background of the Pentecost scenes, the round-topped diamond quarrie windows in the Presentation in the Temple, and the pose of the Virgin and arrangement of angels in the Assumption and Coronation of the Virgin. (Figs 151 – 154)

The condition of the glass in the nave windows of the Cartuja de Miraflores, like some at Fairford, is badly corroded. The best preserved and most curious in its content is a south-wall window depicting the Entombment of Christ. (Fig. 155) As an example I will look at details in this particular window to make a comparison with details found within the Fairford glazing scheme.

Within the composition of the Entombment of Christ there are figures of the three Marys and also of St. John, all of which have nimbuses. The three assistants have been given contemporary dress of the period; the two supporting Christ's body as it is lowered into the tomb are clothed in luxurious outfits, fitting of a nobleman or wealthy merchant, whilst the third holding an ointment pot is clothed more in attire associated with a cleric of the time. What is striking is that these three assistants have facial

¹⁵⁰ Caen, *The Production of Stained Glass in the County of Flanders and the Duchy of Brabant*, 52.

features that appear to be life-like and may be portraits of significant people included as the window was being cartooned. A possible clue as to the identity of the two luxuriously attired men or the maker of the window can be found on their clothing; here inscriptions can be seen on the cuff of the sleeve of the assistant supporting Christ's feet and on the rim of the knee length boot of the one found behind Christ. (Fig. 156) The inscription on the boot reads 'NICODE[mus]', and 'CLAES ROM' is found on the ointment pot held by one of the three Marys in the foreground of the composition. In addition, in the Pentecost window there is an inscription on the hem of the drapery of the lower right-hand figure. (Fig. 157) This inscription, which reads 'NICOLAE ME FECIT', has been argued to be the signature of the Flemish glazier, Niclaes Rombouts.¹⁵¹ If this is the case the inscriptions in the Entombment of Christ window could also be linked to this glazier's signature. (Fig 156)

What is of note, and what has become a recurring feature in this research of comparative works at Fairford is that within inscriptions, where the letter A has a V bar set across it, the A tends to be set in a central or prominent position. This is also seen with the ointment pot in the Entombment of Christ window at Cartuja de Miraflores. Additionally the reversed N found at Fairford, also makes an appearance in this window, although here the reversed N also has a dot set centrally in the diagonal line between its verticals. (Fig. 156)

In the Entombment of Christ window at Cartuja de Miraflores, inspection of the detail used on the buildings set across the three main lights (flanking the hanging figures of the two thieves) reveals similar architectural features to those painted within the Fairford glass. The semi-circular city entrance with its partly closed portcullis appears in the upper tier of the Crucifixion scene in Fairford's east window. The circular turrets with stepped castellated tops, and the conical roofs with side vents and flags on top, are comparable to those painted in the background of Fairford's Transfiguration scene in window sIII. (Fig. 158)

Despite the differences in date and the fact that both Fairford and Cartuja de Miraflores employed many different artists to paint faces in their own technical style from the cartoons provided, there are still common characteristics observable that create mood from the expressions originally drawn by the master designer. The general expressions on the faces are melancholic, created by slightly turned down mouths, bulbous bottom

¹⁵¹ Joost M.A. Caen, *The Production of Stained Glass in the County of Flanders and the Duchy of Brabant*, 50-54.

lips and expressive curves of the eyebrows. (Figs 159 – 162) As these facial characteristics are common to both Fairford and Cartuja de Miraflores, I feel that this suggests that their glazing schemes both came from the same master designer; furthermore, due to other commonalities found in inscriptions and compositions, that this master designer may have been Michel Sittow.

For this suggestion to be possible we need to gain a better understanding of Sittow's known movements, evaluate any reasons that could have led to him being in England at the time the Fairford scheme was being created and then explore how he could have become involved in designing the windows for this new church at Fairford, Gloucestershire.

Possibilities for Sittow's visit to England

It is suggested that Michel Sittow visited England during his employment as the principal court painter to Queen Isabella of Castile, between 1502 and her death in 1504.¹⁵² Although documentation of his visit and presence in England has not been found, it is assumed that a portrait of King Henry VII and portraits of Catherine of Aragon were created by Sittow at this time.¹⁵³

In 1492 Michel Sittow "*melhior Alemann pyntor*" entered the service of Isabella I of Castile as court painter. There the artist, who earned the fifth largest salary, was known for his religious compositions and portraits.¹⁵⁴ Sittow, as part of a royal court, constantly on the move, found himself travelling throughout Spain visiting various cities. However, following a visit to Spain by Philip the Fair, and his wife, Joan the Mad, Sittow left Spain with them when they returned to Flanders in December 1502.¹⁵⁵ What explanations can be given for him leaving the Spanish court, whilst still being in its paid service from his departure until the death of Isabella in 1504? There are two events that may have prompted Sittow to depart. The first regards Sittow's mother, Margaret, who had died in 1501. When this news reached Sittow, he may have been granted leave to sort out his inheritance with his stepfather, Diderick van Katwijk. His stepfather is believed to have travelled in 1501 from Sittow's family home and

¹⁵² G A Bergenroth, ed., "Introduction, Part 2," in *Calendar of State Papers, Spain, Volume 1, 1485-1509*, (London: Her Majesty's Stationery Office, 1862), lxxiii-cxli.

¹⁵³ Gordon Kipling, "Henry VII and the Origins of Tudor Patronage," in *Patronage in the Renaissance*, ed. Guy Fitch Lytle and Stephen Orgel (Princeton: Princeton University Press, 1982), 135; Glück, "The Henry VII in the National Portrait Gallery," 107.

¹⁵⁴ Matthias Weniger, *Sittow, Morros, Juan de Flandes*, 40.

¹⁵⁵ Martin Weinberger, "Notes on Maître Michiel," *The Burlington Magazine*, 90 no. 546 (Sept 1948): 248.

workshop in Tallinn to propose a property settlement with Michel Sittow. In late 1502, having left Spain, Sittow was in Brabant, where he lost his claim of inheritance but refused the property settlement offered by his stepfather.¹⁵⁶

It is interesting that following this appearance in the Brabant courts, Sittow's biography ceases until 1505, at which point he is believed to have entered the services of Philip the Fair.¹⁵⁷ Why did Sittow not return to Spain in 1503? After all, he was still in the paid service of Isabella I at that time.

I would suggest that the second event that prompted Sittow's departure from Spain was the death of Henry VII's eldest son, Prince Arthur on 2nd April 1502. Following years of negotiations between King Henry VII, Queen Isabella I of Castile and King Ferdinand II of Aragon a marriage between Prince Arthur (the son of Henry VII) and Catherine of Aragon (the daughter of Isabella I and Ferdinand II) had taken place in London in November 1501. Following the wedding celebrations, the couple left London to take up residence at Ludlow Castle, the seat of the Prince of Wales. Within a few months of arriving, both Arthur and Catherine were struck ill with a severe virus. Prince Arthur did not survive this and died. Catherine, however, recovered and found herself widowed within a few months of her arrival in Britain, a non-Spanish speaking country.¹⁵⁸

On hearing of Arthur's death and their daughter's plight, Isabella and Ferdinand would have been understandably anxious about their daughter's safety and her future. Following her recovery, Catherine left Wales and returned to King Henry VII's court in London.

In the years following the death of Arthur, fresh negotiations between the Spanish and English courts took place, in order to secure and maintain the union between the two countries. King Henry VII proposed that Catherine should marry his youngest son Henry, who had now been appointed as the Prince of Wales, following the death of his elder brother Arthur. These negotiations, however, were fraught with difficulties, such as ecclesiastical matters concerned with whether the marriage between Arthur and Catherine had been consummated. This proposal for Catherine to marry Prince Henry was a favoured option for both courts, but it was proving difficult to arrange.¹⁵⁹

¹⁵⁶ Richardson, "Portrait of a Man in a Red Hat by Master Michiel," 82.

¹⁵⁷ Chiyo Ishikawa, *The Retablo de Isabel la Catolica by Juan de Flandes and Michel Sittow*, 67.

¹⁵⁸ Philip J. Potter, *Monarchs of the Renaissance: The Lives and Reigns of 42 European Kings and Queens* (Jefferson: McFarland, 2012), 66.

¹⁵⁹ Potter, *Monarchs of the Renaissance*, 66.

Despite these proposals, for security and in the interest of Catherine's safety, Isabella and Ferdinand appear to have also made plans for a safe and rapid return of Catherine to Spain. On 12th August 1502, Isabella and Ferdinand wrote to the Spanish ambassador De Puebla, who was based in London, urging him to press for the return of Catherine to Spain. He was also asked to petition King Henry VII for consent to allow Catherine to return to Spain, and to supply a competent escort for this task. De Puebla was also asked to stress that a freight vessel had been sent for her return and if Henry could not find a suitable escort, then suitable persons would be sent from Spain.¹⁶⁰

By the 12th April 1503, Isabella and Ferdinand's preparations for Catherine's safe return must have been in place, as Isabella and Ferdinand wrote to De Puebla after hearing of the death of Elizabeth of York, Queen of England. It appears that they feared that without a mother figure in place, the negotiations for the marriage between Catherine and Henry, Prince of Wales would not be concluded. Due to this De Puebla was asked to action the immediate return of Catherine to Spain. These contingency plans must have been in place, as there are no doubts or concerns expressed in state letters about arrangements for Catherine's return. Due to this it is reasonable to assume that, following their letter of 12th August 1502, Isabella and Ferdinand had dispatched ships and suitable escorts from Spain to England, for the safe return of their daughter Catherine if the need arose.¹⁶¹

In consideration of the above, Michel Sittow could have left Spain in 1502 as part of this entourage appointed to return Catherine to Spain, in case the marriage to Henry did not proceed. Michel had arrived in Toledo, at the invitation of Isabella and Ferdinand, as the court painter when Catherine was seven and therefore would have been a friendly and familiar person known to Catherine. Michel was also an experienced traveller and would possibly have had some contacts amongst the many merchants operating on trade routes, as his mother was the daughter of the wealthy merchant Olef Mölner (Olef Andersson Mölnare). It is also possible that Michel Sittow could have been sent, as part of this entourage, in order to produce new portraits of Catherine which could then be sent to prospective marriage suitors (a customary practice at this time),¹⁶² if the difficult negotiations to marry Catherine to Henry were to fail.

¹⁶⁰ Bergenroth, ed., "Spain: August 1502," in *Calendar of State Papers, Spain, Volume 1*, 276-286.

¹⁶¹ Bergenroth, ed., "Spain: April 1503," in *Calendar of State Papers, Spain, Volume 1*, 294-305.

¹⁶² Kipling, "Henry VII and the Origins of Tudor Patronage," 135.

In 1502 Catherine was at Durham House, London and stayed with Queen Elizabeth at Westminster from the end of October until 14th November.¹⁶³ During her time in London, it is probable that Catherine joined in the activities of the English Court. Certainly in August 1504, the Princess of Wales accompanied King Henry VII at Richmond, then travelled with him to Windsor where they stayed twelve or thirteen days, going out almost every day into the park and the forest to hunt deer and other game. From Windsor they returned to Richmond, where another week was spent hunting. Following this Catherine became ill and was taken with the king back to Westminster with the Princess Mary, and all the other English ladies. A few days later they all went to Greenwich, where after a week Catherine took ill again, but with a more serious illness than before; at this point she left the court and returned to the house where she had previously lived, presumably Durham House. In consideration of the above, it is clear that Catherine was an accepted part of King Henry VII's court and joined in with its activities.¹⁶⁴

In 1505, whilst resident in Richmond, an encounter took place which suggests that Catherine was aware that Michel Sittow was no longer in Spain, and was actually a lot closer by, probably in England. On 12th August 1505, Catherine met the ambassador Hermann Rinck who had been sent by Maximilian I to meet with King Henry VII. The ambassador had come to settle with the King of England about his proposed marriage to Margaret of Austria, Duchess of Savoy, of whom he had brought two portraits. Upon seeing these portraits, Catherine expressed an opinion that Michel would have produced better portraits.¹⁶⁵

Catherine must have been referring to Michel Sittow, the royal court artist, whom she had known from the ages of seven to fifteen before her departure from Spain to marry Arthur, Prince of Wales in 1501. In addition to this, she may have even known of his current whereabouts as there are portraits of Catherine, that have been attributed to Sittow, which are suggested to have been painted following the death of Arthur in 1502.

One portrait (Fig. 163), by Michel Sittow, possibly of Catherine of Aragon, resides in the Kunsthistorisches Museum, Vienna and may have been painted around 1503, when it is proposed that Sittow was in England.¹⁶⁶ Sittow may have made several studies of Catherine, whilst possibly in England, as there are two other images that exist

¹⁶³ Alison Weir, *Elizabeth of York: The First Tudor Queen* (London: Vintage, 2014), 395.

¹⁶⁴ Bergenroth, ed., "Spain: August 1504," in *Calendar of State Papers, Spain, Volume 1*, 328-331.

¹⁶⁵ Bergenroth, ed., "Spain: August 1505," in *Calendar of State Papers, Spain, Volume 1*, 366-375.

¹⁶⁶ Glück, "The Henry VII in the National Portrait Gallery," 107.

apparently depicting the same subject, but each adopts a slightly different pose. The first is an image of Mary Magdalene and is found at the Detroit Institute of Arts.¹⁶⁷ (Fig. 164) The second depicts the Virgin with Child, originally on the left-hand side of a diptych, with the other half depicting Diego de Guevara, a wealthy Spanish nobleman.¹⁶⁸ The Virgin with Child is now in the Gemäldegalerie Staatliche Museen, Berlin, (Fig. 164) while de Guevara is now found in The National Gallery of Art, Washington, D.C.

In addition to these paintings by Sittow, which suggest that Catherine was used as a model for his studies, the stained glass historian Wayment suggests that a likeness of Catherine of Aragon also appears within the glazing at Fairford. Wayment proposes that the Virgin depicted in the Nativity scene, window nII light b (Fig. 165) has similarities to that of the model used in the portrait of Mary Magdalene produced by Sittow, now in Detroit Institute of Arts (Fig. 164).¹⁶⁹ However, I would suggest a more convincing likeness is seen to Sittow's Virgin and Child, now in the Budapest Szépművészeti Múzeum. (Fig. 166)

Wayment and also Kenneth Munn both allude to several possible portraits or likenesses of members of Henry VII's family and courtiers in the Fairford windows.¹⁷⁰ These suggestions of hidden portraits are discussed below.

In addition to the likenesses proposed by Wayment and Munn, I would suggest that another likeness of Sittow's paintings of Catherine of Aragon can be found in Fairford's glazing. The figure depicting St. Margaret, now in the clerestory window SIII light c at Fairford, when viewed in detail has comparable facial features to those of the model drawn in the painting of Mary Magdalene by Michel Sittow. (Fig. 167) I feel that in the painting and in the window, the broad forehead and facial shapes are similar, as are the raised eyelids, protruding upper lip, length of nose, the chin shape and the hint of a double chin.

If one compensates for a natural degree of inaccuracy in a glass painter's interpretation of the master's cartoon, I feel that the similarities of the facial features are comparable to those used in the possible portraits of Catherine of Aragon, Princess of Wales. If

¹⁶⁷ E.P. Richardson, "Catherine of Aragon as the Magdalen by Master Michiel," *Bulletin of the Detroit Institute of Arts* XIX no. 8 (1940): 82-83.

¹⁶⁸ Web Gallery of Art "Sittow, Michel. Virgin and Child," accessed 13 May 2016, http://www.wga.hu/html/s/sittow/virgin_c.html.

¹⁶⁹ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 95

¹⁷⁰ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 95; Munn, "Fables and Facts," 78-86.

Sittow was the artist responsible for the portraits, then Sittow could have been involved in the design and cartoon for the Fairford glazing.

If we follow the assumption that Sittow was in London, acting as part of the Spanish escort, set in place for Catherine's safe return to Spain and to paint her portrait for prospective future husbands, what possible connections can be found between Fairford and Sittow for the years 1503 -5?

One link may be the inclusion of hidden portraits within the Fairford windows. Joyce first mentions the possibility when describing the Judgement of Solomon window nX. Describing the figures of two standing councillors in the first light of the lower tier, he says 'It contains two fine figures of aged men painted with much skill. Like the two standing at David's right hand, one is bearded and the other entirely smooth; so able is the handling of these heads that it is impossible not to feel a conviction that both are portraits drawn from the life.'¹⁷¹ (Fig. 168)

On describing the figures of the three Marys in window sII lights d & e, Joyce comments on the figure of the third Mary kneeling before Christ 'As this interesting figure has these very marked characteristics, the absence of the nimb, the elaborate and distinctive costume, and a face certainly like a study from life, it does not appear unreasonable to conjecture that it may have been meant for the portrait of some living person at the time it was painted, who wished to be represented kneeling at the Redeemer's feet.'¹⁷² (Fig. 169)

Wayment also comments on this figure of the third Mary 'who curtsies to Christ in a dazzling new outfit from Antwerp.'¹⁷³ Munn compares this Third Mary with a painting attributed to Jean Perréal, of Henry VII's daughter Princess Mary now in the Musée des Arts Décoratifs, Paris.¹⁷⁴ (Fig. 170) Joyce raises the question of portraits again, commenting on the head of St. Peter in window sVI light a, stating 'the head of St. Peter is so strongly characterised as to have the air of a portrait.'¹⁷⁵ (Fig. 171)

Another depiction which was of special interest during the conservation works by Barley Studio was the figure of the Queen of Sheba before Solomon in Fairford's window nV light d. (Fig. 172) The female figure, like that of the third Mary in sII, is

¹⁷¹ Joyce, *The Fairford Windows*, 58.

¹⁷² Joyce, *The Fairford Windows*, 89.

¹⁷³ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 85.

¹⁷⁴ Munn, "Fables and Facts," 81.

¹⁷⁵ Joyce, *The Fairford Windows*, 94.

dressed in contemporary dress rather than biblical. Both Wayment and Munn discuss this figure and suggest that she resembles Queen Elizabeth of York.¹⁷⁶

On the pearl bordered hangings, flowing from the Queen of Sheba's gabled headdress, a minute inscription was discovered. This inscription is set upon the lowest piece, positioned at the lower back of the figure. (Fig. 173) The letters of the inscription are scratched out from the dense matt paint layer, and appear to read 'Roy' at the top and possibly 'Liz' below. Could this inscription be the glass painter's indication that this is a portrait of the queen, Elizabeth of York? Certainly existing contemporary paintings of the queen show her with a gabled headdress. (Fig. 174) During conservation no further scratched out inscription were found in the other windows of the Fairford glazing scheme.

Munn devotes a whole section of his chapter entitled "Fables and Facts" to 'The Hidden Portraits'. In this chapter he systematically takes us through a list of possible hidden portrait candidates including the courtiers and clerics of Henry VII as well as members of the royal family. His list also points to hidden portraits of Sir John Saville in the east window and window nX, Henry VI in window SVI, Princess Margaret in window nII, Bishop Richard Fox in window nIX, Thomas Wolsey in window nX and Henry VII (on the staircase to heavenly Jerusalem) in the great west window wI.¹⁷⁷

Having compared the suggested portraits contained within the Fairford windows with other images of the proposed personages, I agree with Munn, that many of the potential portraits resemble named images of the proposed persons. However, I do not agree with both Munn's and Wayment's speculative proposals that the inclusion of the Prince of Wales' feathers and the hidden portraits indicate that the windows were a royal commission, a gift of King Henry VII to celebrate the marriage of Prince Arthur and Catherine of Aragon in November 1501. We do know that John Tame started work on the new church of Fairford and following his death in 1500, his son Edmund finished it. If it was a royal gift, one would have expected to find far more indications of a royal commission, such as the royal badges and insignia that appear in abundance at sites such as the Henry VII chapel in Westminster Abbey and King's College, Cambridge.¹⁷⁸ A far more likely explanation is that any portraits of royal persons were included to promote the status of the up and coming wealthy Tame family.

¹⁷⁶ Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 95; Munn, "Fables and Facts," 82-83.

¹⁷⁷ Munn, "Fables and Facts," 78-87.

¹⁷⁸ Marks, "The Glazing of Henry VII's Chapel, Westminster Abbey," 164, 168-169.

If they are indeed portraits of the great and good associated with King Henry VII's family, his courtiers and clerics, who could have had contact with the persons portrayed as well as the skills to capture their likenesses for inclusion in the cartoons? If Michel Sittow was in London he would more than likely have been with the Spanish entourage sent to escort Catherine of Aragon. As stated earlier, Catherine was in London and was participating in and enjoying the activities of the ladies of the court with the King and Prince Henry. Sittow, if present, would have had contact with the great and good allowing him the opportunity to capture their likenesses.

Before leaving the subject of hidden portraits I would suggest the inclusion of another and new hidden portrait in Fairford's Judgement of Solomon window nX. In the fifth light of the upper tier a messenger is depicted as young man leaning through an opening; in his left hand he is holding a tablet with words taken from those written in the *Biblia Pauperum*. He wears upon his head a red hat. (Fig. 175)

In 1958 The Detroit Institute of Arts was gifted by Mr and Mrs Henry Ford II a 'Portrait of a Man in a Red Hat' by Michel Sittow. (Fig. 176) In his article published in the Institute's Bulletin 1958-9, E.P. Richardson raised a question: 'The costume does not suggest a court portrait, but someone of the citizen class. I cannot avoid raising the question, suggested by an intangible quality in the portrait: is it a self-portrait?'¹⁷⁹ I cannot resist having the same feeling as E P Richardson when studying their newly acquired acquisition and ask: is this depiction in Fairford's Judgement of Solomon window the same person as depicted in the Detroit Institute of Arts painting of a Man in a Red Hat? Despite the loss of paint in the Fairford image, the facial characteristics are very similar. The narrow eyes, shallow eyebrows, the prominent nose, the Cupid top lip, chin and broad neck are all comparable in detail. These two depictions could be the same person, and if Richardson's hunch is correct, then they are both self-portraits created by Michel Sittow.

If it is Sittow, it certainly speaks in the context of the Fairford scheme: by holding a tablet with words from the *Biblia Pauperum* it suggests that 'I am the messenger of this masterpiece', whilst the As on the sword blade in nX and the A in the bands of the Persecutor in NII say 'I am the executioner'.

If Sittow was in London and involved with the design and cartooning of Fairford's glazing, there must be some connection between the Tames of Fairford and the court of

¹⁷⁹ E P Richardson, "Portrait of a Man in a Red Hat," 83.

Henry VII. All previous scholarly research on the windows of Fairford church has led to conclusions which have become the accepted information that accompanies literature on the windows. One reads that the windows were made by Barnard Flower (the king's glazier), the iconographic scheme was conceived by Richard Fox (Bishop of Winchester at the time) and that Sir John Saville oversaw the works.¹⁸⁰ All of these people had connections with the court of Henry VII, but it is difficult to comprehend why the King and those assembled by him, his glazier, clerics and courtiers would have become involved in the glazing of a new parish church in Gloucestershire. This seems especially unlikely when the king and his mother Margaret Beaufort, at this time, were calling on the services of the best architects, designers, artists and craftsmen to work on their own personal commissions.¹⁸¹

The answer may lie in a connection with King Henry VII's closest and most trusted courtier, Hugh Denys (c. 1440 – 1511). (Fig. 177) Denys was Groom of the Stool to Henry VII and one of the most influential people during the king's reign.¹⁸²

Hugh Denys was the second son of Maurice Denys (c. 1410–1466), Esquire of Siston, Gloucestershire, who was the Sheriff of Gloucestershire twice in the 1460s.¹⁸³ Hugh had an older half-brother, Sir Walter Denys (c. 1437-1505) by his father's first wife Katherine Stradling, who died shortly after giving birth to Walter. Sir Walter Denys's eldest son and heir was Sir William Denys (1470–1533) of Dyrham, Gloucestershire, who became a courtier of King Henry VIII and was High Sheriff of Gloucestershire in 1518 and 1526.¹⁸⁴

What is important in these family connections is that Sir Walter arranged for his son and heir, William, to marry Edith Twynyho. Edith Twynyho was the daughter of the wealthy Cirencester cloth-merchant John Twynyho (1440–1485).¹⁸⁵ Twynyho had gone into partnership with John Tame and the pair expanded their sheep, wool and cloth business in an entrepreneurial fashion, by acquiring large amounts of sheep-rearing lands in Gloucestershire and elsewhere. These lands included Fairford where, in 1479,

¹⁸⁰ Edward Keble, *St Mary's Church Fairford Gloucestershire*, 3rd ed, rev. Geoff Hawkes and Kenneth Munn, (Much Wenlock: RJL Smith & Associates, 2001): 15; Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 96-97; Munn, "Fables and Facts," 85.

¹⁸¹ Kipling, "Henry VII and the Origins of Tudor Patronage," 146/147.

¹⁸² "Hugh Denys," https://en.wikipedia.org/wiki/Hugh_Denys.

¹⁸³ "Hugh Denys," https://en.wikipedia.org/wiki/Hugh_Denys; "Maurice Denys (Sheriff)," [https://en.wikipedia.org/wiki/Maurice_Denys_\(Sheriff\)](https://en.wikipedia.org/wiki/Maurice_Denys_(Sheriff));

¹⁸⁴ "William Denys," https://en.wikipedia.org/wiki/William_Denys.

¹⁸⁵ "William Denys," https://en.wikipedia.org/wiki/William_Denys.

John Tame built the new church of St. Mary's. Twynyho married his daughter Alice, the elder sister of Edith (who married Sir William Denys), to John Tame.¹⁸⁶

It appears to me that the Twynyho and Tame partnership was the mover and shaker in the Gloucestershire region, where the Denys family had important interests in land and property. The inter family marriages (between Sir William Denys and Edith Twynyho, and between John Tame and Alice Twynyho) had unified links between the established land owners and the up and coming entrepreneurs, Twynyho and Tame who were striving to increase their status and establish relationships with those who had status.

An event of importance occurred in the summer of 1502. Henry VII's queen, Elizabeth of York embarked on a journey to Raglan Castle, Wales without the King but accompanied by her sister Katherine. They left Windsor on 12th July, arriving at Raglan Castle by the 19th August, and during this journey the queen made several offerings to sacred sites on her route. At Raglan, she was the guest of Charles Somerset, Lord Herbert. During her stay she received the gift of a pair of expensive clavichords purchased by Hugh Denys from a foreign craftsman and delivered to her by a stranger. Hugh Denys was married to one of the queen's ladies, Mary Roos, who was the granddaughter of Thomas Roos, a close relation of the King's mother, Margaret Beaufort.¹⁸⁷

In addition to his service to the king, with this gift Hugh Denys appears to have been aiming to gain favour with the queen. Interestingly on the queen's return journey to Windsor, the royal party arrived at Coates Place near Cirencester. Here a local guide liaised with the royal party and escorted them to Fairford, where the queen lodged from 10th to 14th September. Whilst at Fairford, she dined on venison and apples supplied by Mary, Lady Hungerford, from Heytesbury.¹⁸⁸ It is most probable that the lodgings she stayed in at Fairford were those occupied by Edmund Tame, in the manor house set adjacent to the newly constructed church, which had recently been rebuilt by John and Edmund Tame. Her stay at this manor house is even more likely, as the manor was still in the ownership of the Crown having been leased to John Tame and his father-in-law, John Twynyho by Edward IV in 1479, an arrangement that continued under Henry VII.¹⁸⁹ During her stay she must have viewed the newly constructed church and

¹⁸⁶ "William Denys," https://en.wikipedia.org/wiki/William_Denys.

¹⁸⁷ Weir, *Elizabeth of York*, 450.

¹⁸⁸ Weir, *Elizabeth of York*, 394.

¹⁸⁹ Annesley, "Fairford and the Golden Fleece," 16; Wayment, *The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, 1.

discussions must have occurred regarding the need to acquire new glazing. Therefore it is possible that following the queen's arrival back in Windsor around the 25th October, further discussions regarding Fairford's need for glazing may have taken place in the royal court. It is interesting to note that in window nX, the Judgement of Solomon, a white flag flies above the roof, just to the left of the Messenger. This flag has been identified as the royal standard of Edward IV,¹⁹⁰ and the figure of Solomon suggested to be a portrait of the young Edward V.¹⁹¹ Could these inclusions refer to the interest of Elizabeth of York, and possibly even a donation towards the new glazing? If the figure of the queen of Sheba is a representation of Elizabeth of York, she is depicted bearing gifts. The timing of these events, the queen's visit to Fairford, the possible arrival of Michel Sittow in England (around the same time) and the enlisting of support from the King's courtiers, all coincide with suggested events considered in this dissertation.¹⁹²

I suspect that Sir Hugh Denys, in collaboration with his half-brother Sir Walter, may have had influence within court circles, bolstered following Queen Elizabeth's visit, to secure the services of the great and the good to assist with the glazing scheme of St. Mary's Church, Fairford. The theologian, designer and craftsman glazier collaborated to produce a glazing scheme of resounding success, which may have laid the foundations for subsequent projects at Henry VII's Chapel, Westminster Abbey, St. George's Chapel, Windsor, Winchester Cathedral and King's College, Cambridge. In areas of glazing at these sites, influences and adaptations can be found that appear to have been taken from Fairford's glazing scheme, including the possible re-use of cartoons.

¹⁹⁰ Joyce, *The Fairford Windows*, 60.

¹⁹¹ Munn, "Fables and Facts," 85.

¹⁹² Weir, *Elizabeth of York*, 392-394.

CONCLUSION

In conclusion, I suggest that in window sVII, the discovered discreet letter A, its differing pedestal and the thistle eyelet tracery sVII A1 were placed as intended clues to reveal the date of the glazing, links with the court of Henry VII and the designer of Fairford's glazing scheme.

The thistle tracery suggests a start date of the glazing scheme in 1503 with a possible completion by 1506-7. Study of the materials and techniques at Fairford demonstrates a remarkable consistency of type and methods used in the glazing scheme. The similarity in the palette of coloured glasses, the paint pigments and the ferramenta, suggests that someone was engaged to purchase the materials and oversee their distribution between the various workshops. The differing hands discernible in the glass painting indicate that they were produced by many glaziers suggesting, like the three smiths who produced the ferramenta, that they were produced by a team of Flemish glaziers subcontracted to Barnard Flower (the King's glazier).

The inclusion of likenesses, several in contemporary dress, displaying the characteristics of the royal family and courtiers of Henry VII suggest that the artist responsible for producing the designs and cartoons had privileged access to court circles and possessed the ability to capture the facial characteristics of the royal court. I propose that the artist that fits this description may be Michel Sittow, having outstanding abilities in design and portraiture, and generally believed to have visited England and painted portraits of Catherine of Aragon and Henry VII.

Sittow's departure from Spain in 1502 fits a timeline for the creation of the Fairford glazing, when Sittow's whereabouts are unknown until after the death of his patron Queen Isabella of Castile in late 1504. It is reasonable to suggest that he was sent to England to paint portraits of Catherine, Princess of Wales, for possible suitors in marriage, following the death of her husband, Prince Arthur.

Sittow may have been engaged in the design of Fairford's glazing under the influence of Hugh Denys, the King's Groom of the Stool, who had family connections with the Tames of Fairford and with the support of Queen Elizabeth of York who visited Fairford in the summer of 1502.

Sittow probably gained experience in glazing during his early training with his father and possibly during his time in Bruges. His knowledge of glazing may have led to his design of the windows in Cartuja de Miraflores which have common design elements to those found in the Fairford, a topic that deserves further research.

Sittow's portraits compare well with Fairford's depictions of faces in their melancholic expressions, and his portrait of a Man in a Red Hat, suggested to be a self-portrait, is not dissimilar to Fairford's Man in a Red Hat depicted as the messenger in window nX .

I am of the opinion that the resulting works at Fairford were so admired at the time of their creation that the imagery and iconography were followed and became the formula for subsequent prestigious glazing projects. This remarkable survival of a European masterpiece in stained glass is testament to the regard subsequent generations have bestowed upon it, to ensure its survival even through times of upheaval, threat and neglect. I am proud to have played my part in preserving this wonderful scheme for future generations.

APPENDIX 1 MILLS AND COX

[PRE-PUBLICATION - ROUGH DRAFT]

MEDIEVAL WINDOWS : WHAT CAN CHEMICAL ANALYSES TELL US?

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Abstract

This paper will compare the decay of medieval stained glass windows from two English churches: St. Mary's, Fairford and St. Mary and All Saints, Checkley. The glass in both churches has been chemically analysed using Electron-Probe Microanalysis, X-ray powder diffraction and Fourier Transform Infrared spectroscopy. Whether the window orientation plays a part in influencing the extent of decay will be considered.

Introduction

It has been known for a long time that glass is susceptible to attack by aqueous solutions and atmospheric agents. It was established as early as the late sixteenth century that panels of glass should not be stored face to face as this damaged the surface. It is important to note that if the surface is scratched or damaged during manufacture, these areas act as primary sites for attack.

Medieval window glass is typically of the potash-lime-silica type, otherwise referred to as *forest glass*. This has a very different composition to the earlier Roman and the later Renaissance and modern glass. Roman glass was of the soda-lime-silicate variety, the alkali coming from sources such as mined sodium salts; later European material more typically contains mixed alkali sources and modern window glass is similar to its Roman counterpart.

It is the necessary inclusion of additives, whether deliberately or otherwise, that affects the durability and hence affects the stability of the glass over the centuries. Other factors that are to be taken into account (other than composition) are the environment in which the glass was made, the surroundings in which it has been kept, the nature of the attacking agent and the age of the glass.

The environment to which a window has been exposed is difficult to monitor and indeed little or no information is available on such. For example, panels could have been moved from church to church, moved within the church (reversing or transferring

north to south *etc.*) or replaced. Late replacements of individual pieces of glass are normally easily identified by their chemical composition; contemporary replacements can be difficult to identify. There is good evidence to suggest that the positions of the panels of stained glass, within the churches referred to in this paper, have not been altered since their installation. They have, however, been restored numerous times.

Background

A great deal of research has been done on the subject of the atmospheric attack of medieval window glass. Perez-y-Jorba *et al.* (Perez-y-Jorba *et al.* 1975, 1978, 1980; Bettembourg 1977) have studied the effect of the atmosphere on French window glass whilst Fitz *et al.* (Fitz *et al.* 1984; Fitz 1986) worked on German glass and Austrian glass was studied by Schriener (Schriener 1988). Previous work on English glass has been largely centred on the glass of York Minster (Cox *et al.* 1979; Gillies and Cox 1986, 1988; Newton 1988).

The culmination of the above work is that we now appreciate that water is the primary attacking agent and that even large quantities of such pollutants as sulphur dioxide will not cause damage unless water is present (Douglas and Isard 1949; Adlerborn 1971; Fitz *et al.* 1984).

The mechanism of decay is thought to progress as follows (Paul 1990;180) :-

- ▶ Water attacks the surface of the glass producing a leached layer via an ion exchange reaction (by removing alkalis from the glass into solution and hydrogen ions replacing them).
- ▶ The solution is alkaline in nature and thus further attacks the glass network by breaking siloxane bonds.
- ▶ The products (generally expressed as hydroxides) can then react with gaseous oxides to form carbonates and sulphates.

There is some uncertainty as to whether they form simultaneously or whether carbonates form first and are subsequently converted into sulphates.

Most sulphates are only weakly soluble, hence when water evaporates from the glass surface they are left behind as deposits. These are the decay products. Previous workers have identified amorphous silica, calcite, gypsum, syngenite, palmerite, epsomite and various unidentifiable phases (Perez-y-Jorba 1978; Gillies and Cox 1988a,b). In the extreme form of weathering, the decay products can cause the glass to become opaque and thus render the window less than functional.

Some workers have claimed that the decay of glass can be explained solely by bio-deterioration, although in England there is no evidence to suggest that micro-organisms are present let alone cause the decay (Krumbein 1991). Lichen has been observed on some French glasses and calcium oxalate was identified as an excretion product formed by bacteria (Perez-y-Jorba 1980). No cases have yet been found in the U.K. where lichen is present on vitreous surfaces, although there are some churches that have excessive algae and moss growth on their north-facing windows. Also some fungal hyphae were identified at York Minster (Gillies and Cox 1988b).

The decay of glass can manifest itself in one of three general ways, *apparently unweathered, pitted and crusted*. The former is characteristic of high soda high silica glass (Gillies and Cox 1986). The latter form is believed to be the final stage of deterioration. Therefore decay is said to extend from isolated circular pits which vary in depth and diameter, to pits that merge together until the whole of the surface has been affected. It is then that a decay crust builds up.

Conservationists are faced with the problem of whether or not to remove these decay products. If they are removed then fresh glass is exposed to the environment, but if they remain they spoil the aesthetic beauty of the window. Leaving the products in place does not necessarily mean that the glass is protected. The sulphates do *not* form a barrier to the environment and so decay can proceed; they will however make any solution that forms less aggressive.

Location

The specimens of glass described here are from St. Mary's, Fairford, Gloucs. and St. Mary and All Saints, Checkley, Staffs. The Fairford (FAI) glass dates to c.1500. The glass is of the later European type. The specimens from Checkley (CHK) date from 1320-1340 and the glass is typical of the 12th-14th century. Each church provided 66 pieces of glass for study whilst the windows were being restored by Keith Barley of Barley Studios, Dunnington. The samples

were selected as being representative of the most corroded glass present in the panels available. Importantly it was possible to select glass from both north- and south-facing windows, thus enabling orientational affects on the extent of deterioration to be considered. In the case of Checkley there were 34 north- and 32 south-facing specimens, whereas the decay at Fairford was almost non-existent on the north side and therefore only 22 were selected from such panels.

Methods

The chemical composition of the glasses was determined using a Cambridge Instruments scanning electron microscope (model 90B), in association with a Link Systems X-ray analyser (model AN10000) and software. A small area of glass (from under the leading) was carefully ground and polished to a 1 μm finish. Each sample was analysed five times by exposing it for 100 seconds to the beam to determine the major/minor components, some thirteen oxides in total. The weight percentage of the oxides was then averaged and converted into molar percentages. Figure 1 provides a summary table of the compositions for each site. It can be seen that the amounts of silica and potash present in the two glass types are markedly different.

For each sample that had decay products a small amount was removed. This sample was analysed using Diffuse Reflectance Infrared Fourier Transform spectroscopy (DRIFT) and then complementarily analysed using X-Ray Diffraction (XRD). The former provides information on functional groups present in the unknown, whereas the latter conveys information on the crystal structure. In the present application of the techniques the unknowns are compared with standard minerals to improve the identification process. DRIFT is useful because it gives good results for a small sample; XRD gives a better indication of the relative amounts of individual compounds present in the mixture.

Discussion

It is possible to condense chemical compositional information from values of the oxides to three reduced variables (Illife and Newton 1974). These are collectively termed "ternary co-ordinates". These co-ordinates represent the glass network formers ('SiO₂'), alkaline-earth oxides that modify this network ('RO') and the effective alkali content ('R₂O'). Figure 6 shows the type of plot that can be produced from such data. It is clear that there are two principal groups. These groups are not due to the different ages of the

glass, as might be expected, but it appears that the blue/colourless/ruby glass from Fairford is of a distinctly different composition to the remainder of that group, i.e. the coloured glass at Fairford is not of the expected late European type but is still that of the earlier medieval period.

An alternative way of studying the stability of glass (representing the general glass composition) is to calculate the free energy of hydration (Paul 1977) using the following formula:-

$$\Delta G = \sum X(\Delta G_x)$$

Where X is the molar percentage of the elemental oxide within the glass and ΔG_x is the free energy of hydration for the relevant silicate. The more negative the value the less durable the glass. Figures 2-5 use this parameter as a means of comparing composition with the extent of decay. In each case the markers identify different possible groups. The extent of corrosion is determined by an arbitrary visual classification. The value 1 represents durable glass, 2 = isolated pits, 3 = merged pits, 4 = totally pitted surface and 5 represents one that has a thick opaque crust.

Figure 2 shows how the major component of the corrosion is related to the extent of decay. The majority of samples contained gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), whereas relatively few had any calcite (CaCO_3) present. Syngenite ($\text{K}_2\text{CaSO}_4 \cdot \text{H}_2\text{O}$) was identified as a minor product in a limited number of cases. This could be due to the unstable nature of syngenite in humid conditions, since it readily converts into gypsum.

There is a clear divide at the value $\Delta G \approx -8$, which splits the glasses into location, or more likely age categories (see fig.3). It can also be seen that there is a vertical divide in extent of decay which appears to correlate with window orientation for a particular chemical composition. That is, glass from a south-facing window is more decayed than that from a north-facing one, for the same composition.

This effect is superimposed upon the trend for a high ΔG value (more negative) to mean a less durable glass (more corroded, see fig.4). Finally it can be seen that there is no apparent link between the colour of the glass and the extent of corrosion (see fig.5).

Conclusions

The data presented in this paper suggests it is possible to discern the effect that window orientation plays in the decay process of medieval glass. In the case of Fairford, the difference in extent of corrosion between the south- and north-facing glass is immediately obvious on visiting the church, but until this analysis was undertaken it was not known that the glass was of the same composition. However the difference at Checkley is not as obvious, mainly because of the large amount of algae/moss on the north-facing windows. This has led to the corrosion on the north being more marked than at Fairford. Also the glass at Checkley is of a much less durable type and therefore the corrosion is more advanced.

Glass from other churches needs to be investigated in this manner before it can be definitively stated that the orientation of windows plays a key part in influencing the decay process. There could be more specific factors that explain this difference, such as the prevailing wind direction, local geography, unrecorded alterations to the windows etc., but until more data are available these will remain hidden. Also, further research is needed to enable the correlation between corrosion product and extent of decay to be more thoroughly investigated.

Acknowledgements

We wish to thank Mr Keith Barley for kindly providing the specimens of glass and for stimulating discussions on this subject. We also express our thanks to Revd. A.J.L.Hodgson and Mr. John Mallerson for permitting window glass in their care to be examined and analysed in our laboratory. Mr S. Moehr skilfully polished all the glasses prior to analysis. We acknowledge E.P.S.R.C. for financial support and for providing one of us (P.Mills) with a studentship.

Location	mol% of oxides									Ternary co-ordinates		
	Na ₂ O	CaO	K ₂ O	MgO	SiO ₂	Al ₂ O ₃	P ₂ O ₅	Fe ₂ O ₃	MnO	'SiO ₂ '	'R ₂ O'	'RO'
Fairford	2.3	21.9	5.4	5.8	59.7	1.5	1.3	0.2	0.9	63.9	6.2	28.9
mean ± std	±	±	±	±	±	±	±	±	±	±	±	±
n=66	0.8	3.4	3.0	1.6	2.2	1.4	0.3	0.1	0.3	2.6	2.8	2.3
Checkley	3.3	15.9	10.2	10.9	54.1	0.9	2.3	0.2	0.9	58.6	12.4	27.9
mean ± std	±	±	±	±	±	±	±	±	±	±	±	±
n=66	1.2	1.2	2.1	1.4	1.9	0.3	0.4	0.2	0.1	1.6	1.2	1.2

Figure 1: Table of the chemical composition of the glasses

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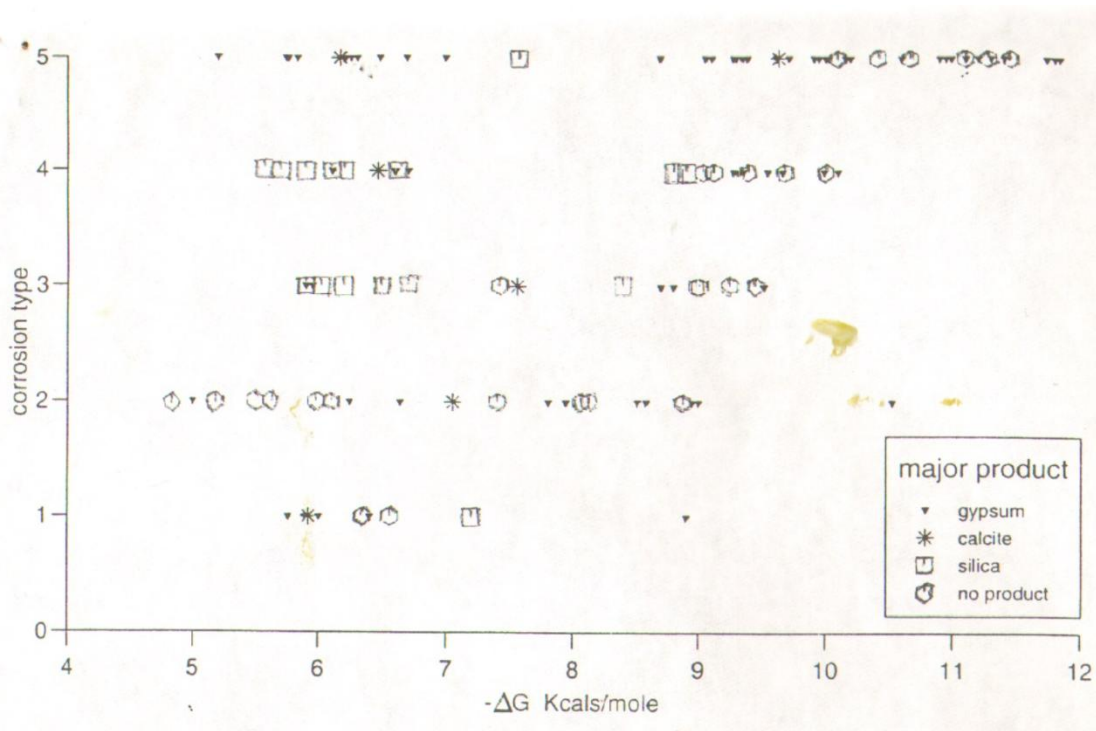


Figure 2 : The relationship between corrosion product and type for both locations

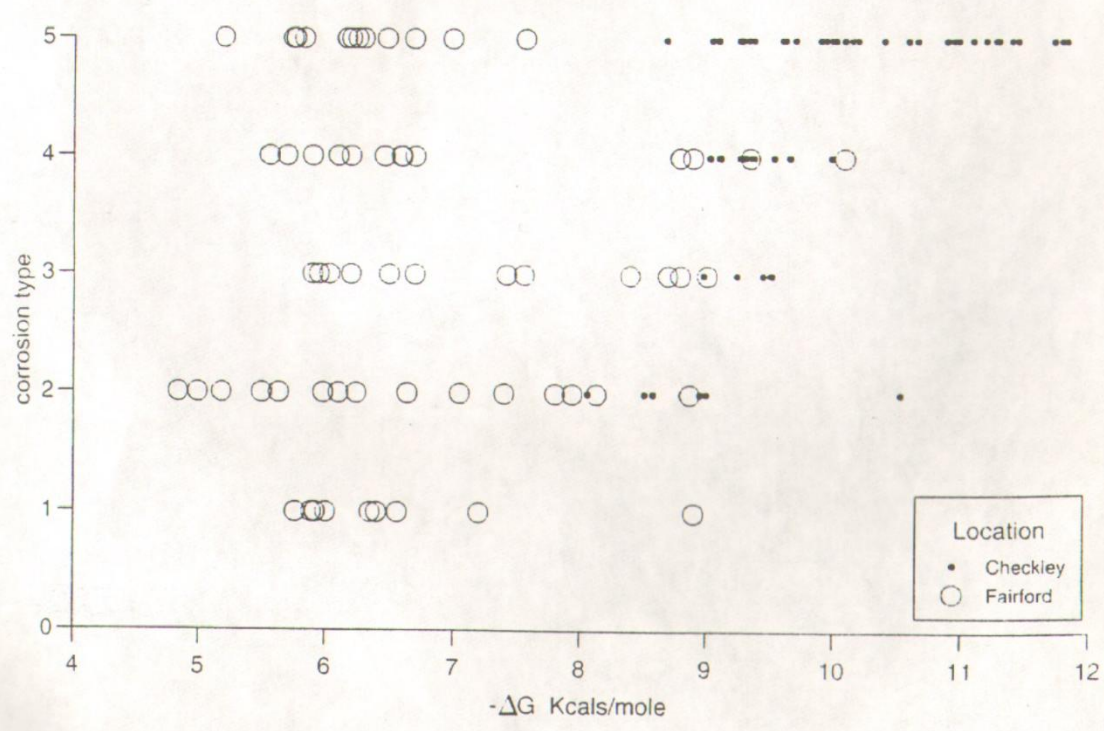


Figure 3: The relationship between corrosion type and location.

Fig 4

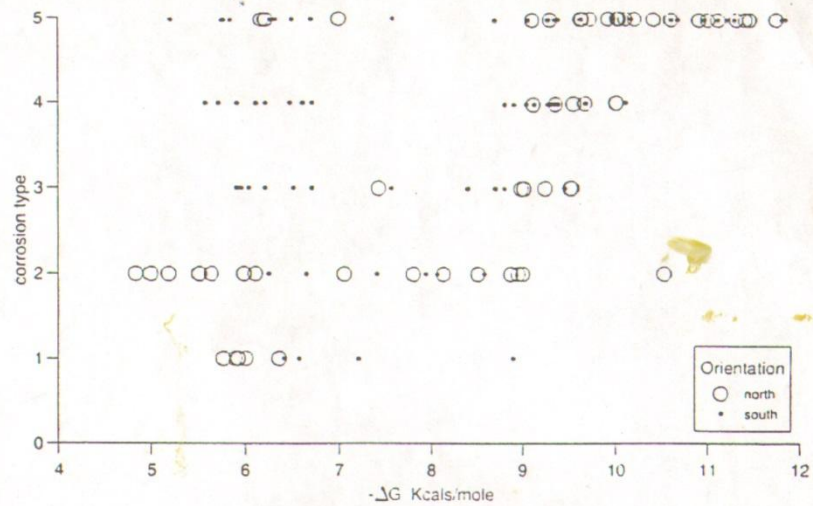


Fig 5

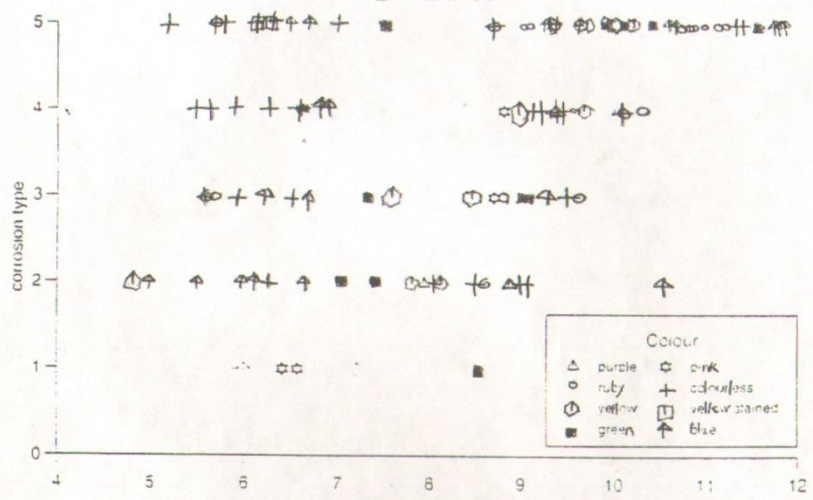
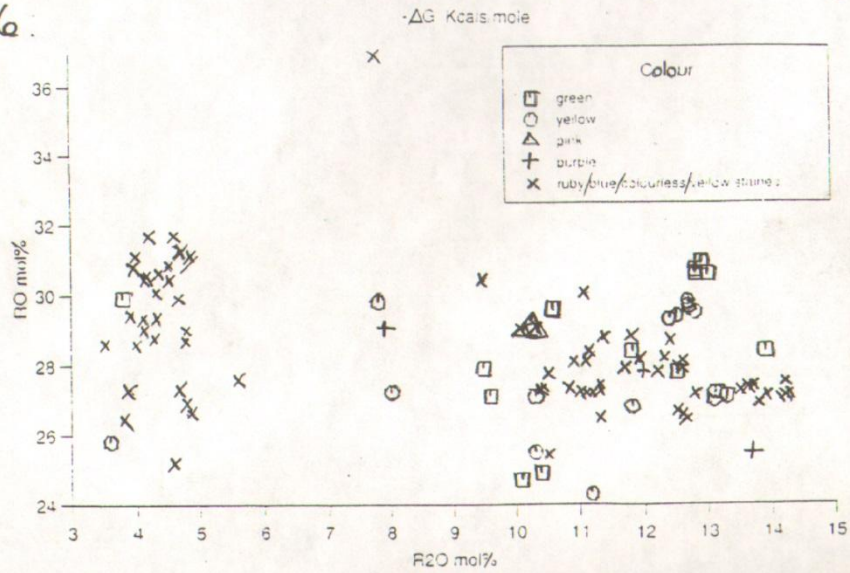


Fig 6



APPENDIX 2 FREESTONE

Fairford glass analyses

Access to glass from St Mary's Church, Fairford was kindly provided by Mr Keith Barley, of Barley Studios. It was possible to take around 100 samples from window nVIII, while it was removed from the leads on the conservation bench.

The glasses were analysed by energy dispersive X-ray spectrometry in the scanning electron microscope (SEM-EDS) for elements present in amounts greater than 0.1%. In addition a selection of glasses were analysed by Laser Ablation Plasma Mass Spectrometry (ICP-MS) for trace elements – these results are not discussed here.

All glasses comprise potash-lime-silica glass, and are consistent with window glass of the sixteenth century or earlier.

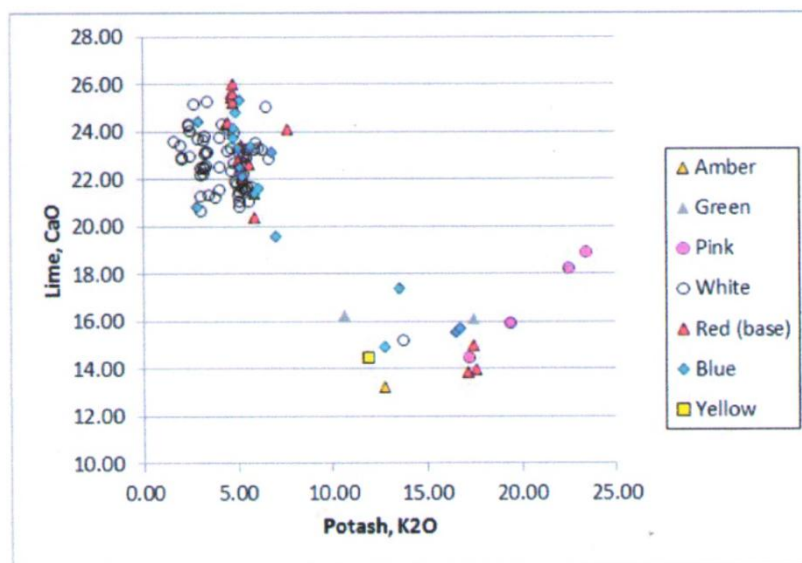


Fig. 1. Potash and lime contents of all glasses analysed

As shown in Fig. 1, the glass falls into two major groups.

The first comprises most of the white glass, most of the flashed red glass, and most of the blue glass. It contains 20-25% CaO and 2-7% K₂O. This is commonly called high-lime low-alkali glass (HLLA). HLLA is typical of the late medieval to post-medieval periods. A survey of uncoloured window glass in secular buildings in Britain by David Dungworth of English Heritage indicates that this type of glass was not used for plain glazing in secular buildings until around 1570. Its occurrence in the Fairford window therefore indicates that the glass is likely to have been imported from an area of continental Europe, such as Lorraine. It will be noted that the colourless and red/blue glasses are more-or-less the same composition. However, a detailed comparison (not shown here but see Fig. 2)) suggests that they were made with different sands and therefore may represent the outputs of different workshops.

The second group comprises glass with higher potash (10-24%) and lower lime (13-19%). This is an older type of glass and is more typical of the 12th-15th centuries, although we know that it was still being made through to the eighteenth century in parts of Europe and possibly Britain. In addition to a few reds and blues, probably recycled from earlier windows, this group contains “difficult” colours, amber, green and pink, which appear to have required special furnace conditions. At the present time, we cannot say whether these glasses represent material from earlier windows, or if their manufacture was continuing according to the traditional methods in the early sixteenth century when they might represent glass obtained from a specialist workshop.

Note that the Fairford situation differs from that a century earlier, represented by the glass of John Thornton. As shown in Fig. 2, The Thornton glass of the Great East Window falls into two very distinct groups. The colours have high lime and low silica, while the white glass has low lime but high silica. The two Thornton groups have similar potash contents. At present we believe that the white Thornton glass was made in England (probably Staffordshire), whereas the coloured Thornton glass was imported. At this time the imported colours had a new base composition which time has shown to be prone to corrosion (pitting), as it has relatively low silica, less than 54% (Fig. 2). Comparing the Fairford glass (Fig. 2) it can be seen that most of the glass has silica contents similar to the stable Thornton white glass, and is therefore relatively resistant to weathering. However, the pink glasses in particular have low silica and high potash (Fig. 2) and are therefore likely to show a greater tendency to decay.

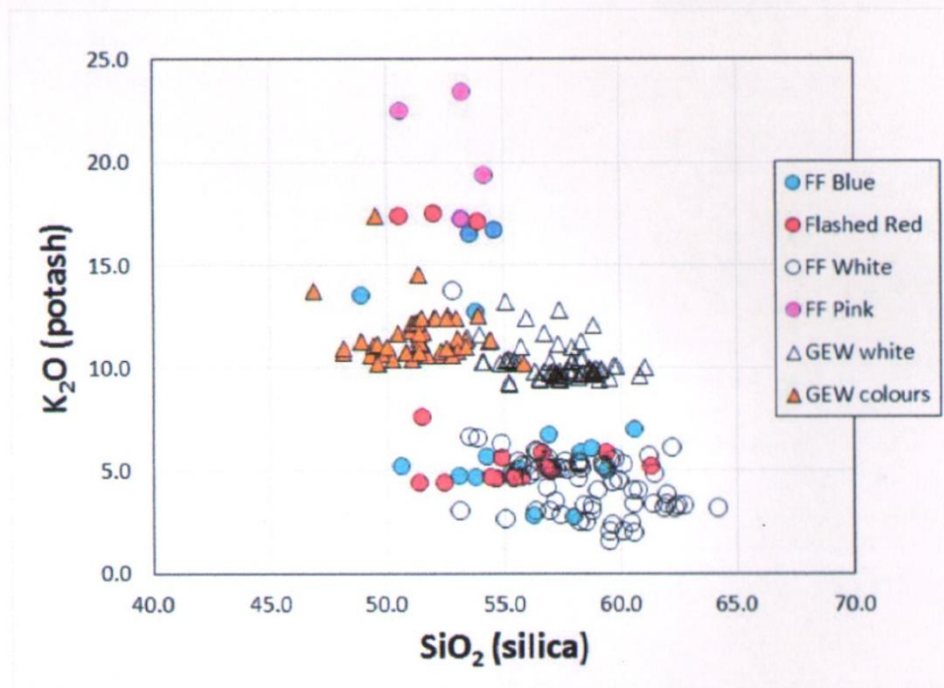


Fig. 2. Compositions of Fairford blue, red, white and pink glasses compared with those of the Great East Window of York Minster.

Ian Freestone, 27.08.2015

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