Stained glass as an interface between art and architecture

Ariane Janse van Rensburg
School of Architecture and Planning, University of the Witwatersrand, Johannesburg
E-mail: Ariane.jansevanrensburg@wits.ac.za

Stained glass occupies a conjunction between glass painting as art and windows as architectural components. Originating as a form of painting, it was an integrated element in the architectural design of gothic cathedrals. Paintings and windows diverged over centuries while stained glass largely became added decoration until the time of the arts and crafts movement, when certain architects re-embraced it, designing their own glass decoration. This architectural awareness of the potential of art glass eventually led, on the one hand, to the first conceptual integration of glass art and architecture since the middle ages, and on the other hand to the emancipation of glass art from architecture, generating new three-dimensional techniques which can again be introduced into buildings. This article outlines different types of creative relationships between artists, architects and glaziers and briefly looks at some of the possibilities being explored in glass art within architecture.
Key words: stained glass, glass painting, church architecture, architectural glass, windows

Les vitraux-peints comme rendez-vous entre l'art et l'architecture
Les vitraux-peints ont leur demeure dans la peinture et dans l'architecture, comme fenêtre. Peinture d'origine, elle s'est intégrée dans l'architecture des cathédrales gotiques. D'après, la peinture et l'architecture se sont séparées, pendant que les vitraux sont devenus décorations ajoutées jusqu'au temps des «arts and crafts», quand certaines des architectes avaient encore découvert des vitraux peints, en dessinant leur propre décoration. Cette savoir du potentiel du verre avait, comme résultat, à l'un coté la première intégration de l'architecture et du vitrail dés le moyen âge, et à l'autre, l'émancipation du vitrail de l'architecture, en créant des nouvelles méthodes à trois dimensions, qui peuvent se présenter à l'architecture de nouveau. Cette article définit des parentés créatrices entre des architectes, des artistes et des vitriers et considère, en bref, des exemples courants de l'art de verre dans l'architecture.
Mots-clés: Vitraux peints, peinture de verre, architecture des églises, architecture en verre, fenêtres

Stained glass, a painting technique which was already imported from France and used in Monkwearmouth, England, in 675 AD (Archer 2005: 2), has come to find itself firmly installed in an architectural frame to the extent that a "stained glass window" has become a generic concept.

How the painting became the window

The unique position of stained glass in architecture is easy to understand if one looks at the historical technical development of glass painting and of glazing. In the eleventh century the Scholastic movement sought to consolidate, classify and communicate knowledge under the auspices of scholarly clerics (Panofsky 1976. and thus for the first time the Roman Catholic Church wanted to disseminate scriptural content to the illiterate masses through extensive visual images. The size of church buildings increased, there was an emphasis on narrative decoration and they were looking for a strongly visible technique.

At this stage in architectural history windows were not glazed: On rare occasions, openings were closed to the weather by translucent sheets of mica or alabaster to admit low-level illumination, e.g. in the tomb of Gala Placidia, Ravenna, 470 AD (Lassus 1966: 54). Generally, even in royal palaces, windows were draughty openings closable to the weather with wooden shutters or heavy drapes, confined to the minimum size needed to admit light and air.

After the millennium, cathedrals in France especially developed as large stone structures with as few openings as possible, dimly lit by candles. In warmer Mediterranean climates Byzantine basilicas had far larger clerestory windows, letting in a very different quality of light which could illuminate mosaics or even frescoes, but in France and England this was not practical. The technique of choice in gothic cathedrals became painting with vitreous paints on an assemblage of pieces of glass of different colours. These were dramatically brilliant when

backlit, which required that the paintings be placed in front of openings in the wall, keeping out the weather.

The Romans had already developed excellent glass-blowing techniques but flat, even glass, suitable for painting, remained difficult to produce. In medieval times glaziers produced flat glass "metals" in jewel-like colours (Archer 2005: 4), of roughly 150mm x 150mm. Glass at this time contained many impurities, giving each fragment of glass unique variations in refraction and colour intensity; a key component in the beauty of windows such as those at Chartres. Visual transparency in flat glass had not yet been achieved, and was not even desirable in painting at the time, although translucent clear glass was being produced.

At that stage, the different fragments of base glass were joined using a framework of lead, first cast on reeds and later as H-shaped soldered calms (Archer 2005: 3). Lead bends easily around glass, but also bends under gravity when suspended horizontally, putting stress on the glass, so these assemblages had to be vertical. The result was a glazed, leaded window: an architectural component.

The process of building a gothic cathedral remains a high point of craftsmanship in western architectural history. In many cases, the name of the architect-bishop / master mason in charge of the concept is not even known, but the basic underlying scholastic ordering (Panofsky 1976) was strong enough that individual artists could all work within this framework as creative individuals to produce a rich, seamless whole. Many artists produced the stained glass paintings, each an individual work of art, but the ordering of each window's symbolism was an integral part of the architectural design, although the paintings were not "designed" by the architect. The best example of the total integration of architecture and glass painting is the late gothic Sainte Chapelle, Paris, (figure 1) consecrated in 1248 and probably designed by Pierre de Montereuil (Grodecki 1975: 6) where the thirteenth and fourteenth century stained glass windows, produced by three different workshops of glaziers (1975: 54), became the fabric of the building and display a very subtle iconographic programme (1975: 49).

In the field of architectural glass technology, medieval leaded glass paintings led to the development of plain windows using leaded, translucent glass (often roundels) to close wall openings and let in light. This branch of development pursued visual transparency, leading after some centuries to the clear, glazed window (Hirst, Pearce & Tutton 2007) and eventually window-walls as we know them today, where glass has ideally become invisible. This absolutely regular glass can be toughened, laminated, suspended and used structurally, and glass sheets can be produced in sizes of roughly 3m x 3m, and here glass production became divorced from art.

Developments in glass painting

Glass painting techniques were also being developed. Silver stains came into use in the early fourteenth (Archer 1985: 14-15) and coloured enamels were developed to copy developments in oil painting techniques (Archer 1985: 27), as can be seen in the work of glass painters such as Abraham van Linge in the early seventeenth century (figure 2). Acid etching only became a popular technique much later, along with the use of metallic lustres.

Church windows retained the function of biblical narrative, but from gothic times onward they were also used to recognize donors, pay homage to those in authority and proclaim the church's magnificence. In the 1840's in England, the giving of stained glass windows as memorials became very popular (Archer 1985: 36). In parallel with biblical windows, the heraldic window developed, reaching its zenith at the end of the sixteenth century in England

(Archer 1985: 24), proclaiming the secular authority of members of the nobility (figure 2). As other painting techniques developed, stained glass with its limitations of cost and backlighting requirements was no longer the preferred medium for visual narrative, portraiture or recording. Oil paintings were far more versatile and transportable and as oil techniques developed, glass painting stagnated. The role of the architect developed into that of the designer of the built fabric rather than the conductor of an orchestra of artists.

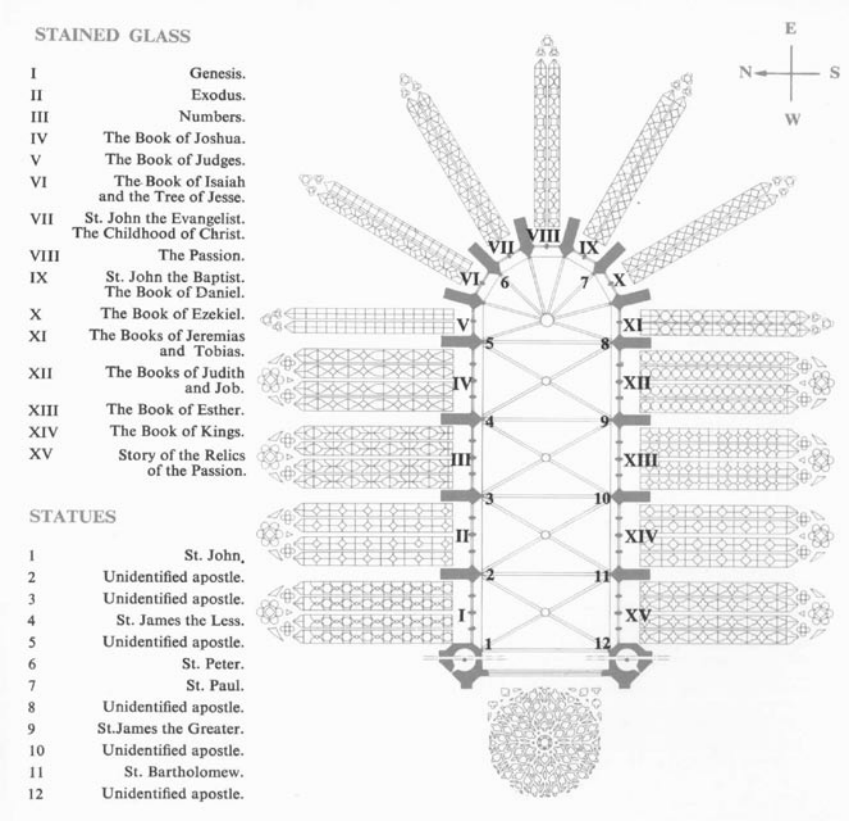

Figure 1
Top left: Interior, Sainte Chapelle, 1243 -48, Paris (Hartt 1976: 425).Top right: Detail "Judith bearing the head of Holofernes" thirteenth century, from window XII-15, The books of Judith and of Job (Grodecki 1975: 59). Bottom: plan of the chapel showing iconographic ordering of window themes (Grodecki 1975: 69).

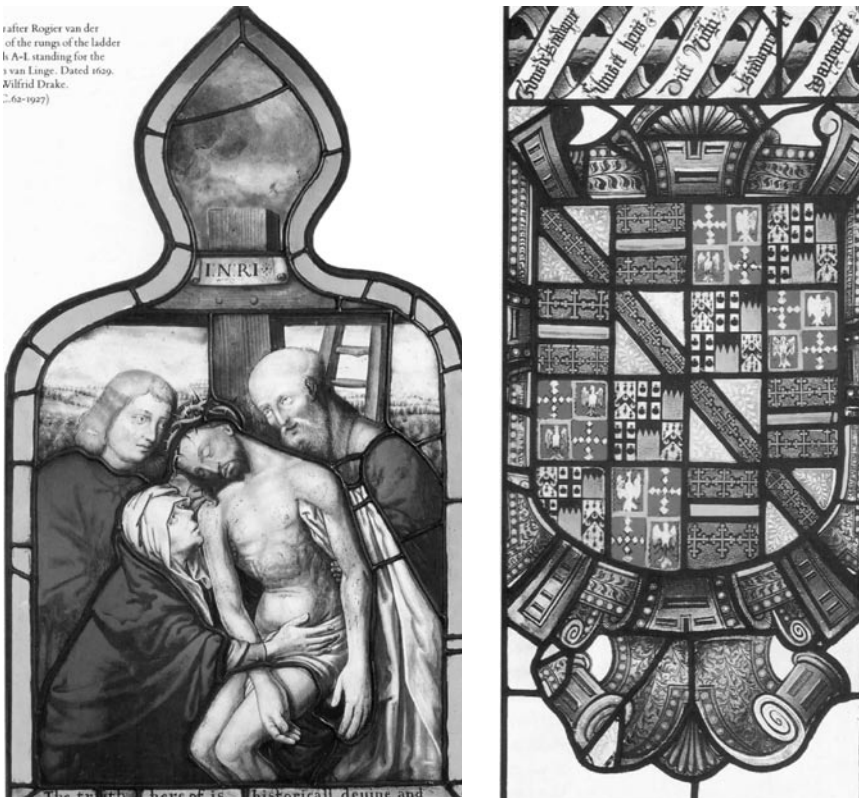

Figure 2
The use of enamels: Left: "The Deposition" after oil painting by Rugier van der Weyden, glass painting by Abraham van Linge, 1692 (Archer 1985: 27). Right: The arms of Beaupré and Fodringaye from Beaupré Hall, Cambridgeshire, c.1570, in Victoria and Albert Museum, London (Archer 1985: 26).

Stained glass windows became "paintings on (in) the wall", a coloured filter of light with a predictable interior impact, commissioned afterwards, and not influencing the architect's concept. Stained glass windows were still used in churches and manor houses as a traditional architectural element with the function of creating an impressive interior. The subject was most often prescribed by the client, not allowing for much freedom of expression, and stained glass as an art medium remained in a decline until the nineteenth century when the gothic revival movement under John Ruskin (1819-1900) reawakened interest in the original qualities of medieval glass painting (Cousins 1995: 24).

With the advent of the Arts and Crafts movement under William Morris in the late 1800's, stained glass was viewed in a new light as a form of craftsmanship which should enhance even humble architecture, and a much greater degree of integration between glass painting and architecture was achieved. The architect still saw stained glass as a form of decoration, but it was integrated decoration following the concept or theme of the architecture, and sometimes designed by the architect himself.

In the 1880's Louis Comfort Tiffany (1848-1933) worked on developing new types of opalescent glass with sufficient intrinsic variations in colour and tone that small pieces of glass could be assembled into images, avoiding painting techniques (Cousins 1995: 43-44). The beauty of this glass and the ease of producing an image sparked a wave of popularity in America and brought about a shift in concept. In the popular mind, "stained glass" no longer meant glass painted with vitreous paints and silver stains, but a backlit image assembled from coloured glass, framed by black lines (figure 3). It opened the field to anyone as an accessible craft technique, and put leaded glass motifs in doors into the normal interior decoration budget. Stained glass was no longer the exclusive province of the church and the nobility (Cousins 1995: 26).

Figure 3
The three-dimensional use of stained glass. Left: Louis Comfort Tiffany, *Dragonfly lamp*, in Allentown Art Museum, 2007 (Anonymous e). Right: Stephanie Fassler-Ross, *Metamorphosis,* Anglican Church, Constantia, Cape Town (Photo: Janse van Rensburg 1994).

Tiffany also developed a foiling jointing technique with which more rigid joints could be formed and architectural artifacts with inclined surfaces such as lamp shades became possible. An example of the three-dimensionalized use of foiled glass is the Metamorphosis window by Stephanie Fassler-Ross (born 1941) in Sophie Gray's Anglican church in Constantia, Cape (figure 3).

Architects as artists

Architects inspired by the Arts and Crafts movement started to design all the interior details in their buildings, including the furniture, the light fittings and the stained glass windows. This integrated design approach continued into the modern movement, where stained glass became one of the crafts included in the Bauhaus architecture course, 1919-1933. Once stained glass window design became the province of architects, stained glass style developed in tandem with architecture into a fully-fledged modern idiom between 1900 and 1930, although the traditional style of window painting, independent of architects, still continued in the traditional churches. Architects' designs were usually for leaded (as opposed to painted) windows, making it possible to have them executed exactly without interpretation. This made the architect into the artist and the glass craftsperson simply another artisan in the building team.

The architectural metamorphosis can be mapped by examples such as the Willow Tea Room, Glasgow, 1901-1904, by Charles Rennie Mackintosh (1868-1928), in Art Nouveau style, while Frank Lloyd Wright (1867-1959) took it into Art Deco (figure 4). He did extensive designs for stained glass windows in many of his projects (Moor 1989: 15). Theo van Doesberg (1883-1931) did panels for the Café l'Aubette in Strasbourg, 1926 and since destroyed, in "de Stijl", which were considered to be "a landmark example of the integration of art and architecture" (Moor 1989: 16).

Historically, the most visible modernization of stained glass happened with the development of thick glass slabs, which could still be painted, but in a very different style. The dalle de verre technique was developed by Jean Gaudin in 1927 as the translucent counterpart of brutalist concrete. (Anonymous, d) He used slabs of coloured glass, 30 – 35mm thick and usually 200 x 200 mm or 300 x 300, developing a technique of cutting or breaking them into desired shapes, producing light-catching facets, and casting them into reinforced concrete to produce load

bearing structural glass panels. Stained glass was thus no longer structural infill, but the structure itself. With dalle de verre, the final design happens in the making: the artist is the craftsman.

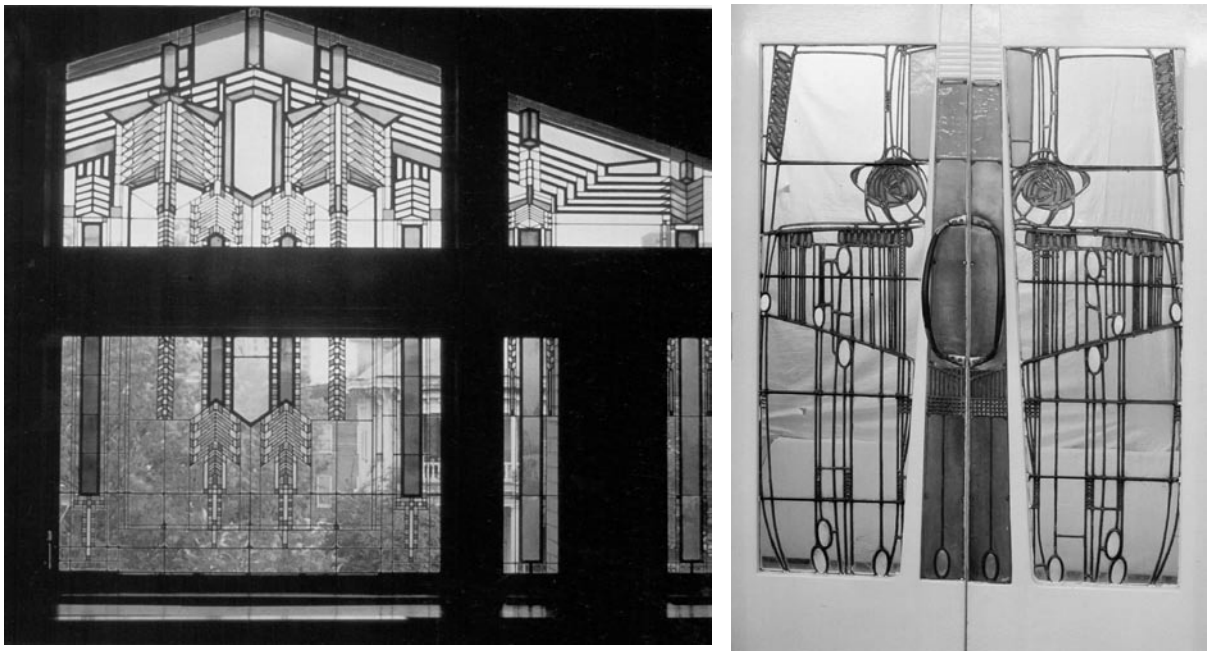

Figure 4
Left: Charles Rennie Mackintosh, leaded glass doors from the Willow Tea Room, 1901-04 (Cousins 1989: 74). Right: Frank Lloyd Wright: Leaded glass in clear and yellow (silver-stained) bedroom window, Dana House, Illinois, 1903 (Moor 1989: 15).

Figure 5
le Corbusier: Notre Dame du Haut, Ronchamp, France (Bolle-Reddat 1965: 19).

Le Corbusier (1887-1965), as an architect-artist, designed his own windows in Notre Dame du Haut, Ronchamp, France, 1950-54 (figure 5). More often dalle de verre windows grew from a dialogue between the architect and a glass artist from the conceptual stage onward, resulting in a generally richer interrelationship between architecture and art. The best local example is probably the Burgerspark NG Kerk, Pretoria, where artist Leo Theron and architect Daan Kesting collaborated from the beginning to produce an architectural artwork (figure 6). It is of course also possible to use this technique to retro-fit dalle de verre into existing window

frames in more traditional buildings, as proved by the windows by Gabriel Loire (1904-96) in St George's Cathedral, Cape Town, or Leo Theron at the Stellenbosch Moederkerk, 1961-89.

Figure 6
The church calendar. **Dalle de verre wall by Leo Theron, Burgerspark Dutch Reformed Church, 1969, Pretoria (Photo: Janse van Rensburg 2008).**

Dalle de verre was the major 'stained glass' development in the twentieth century until the manufacture of fusible compatible glass, which made it possible to melt different colours of glass to join without any black lines. Different colours were developed to have the same coefficient of expansion, avoiding destructive stresses developing from differential contraction when glass cooled and set. Other epoxy techniques were also developed to layer coloured glass. A local architectural example is the "Galaxy" window by Karl-Heinz Wilhelm, commissioned by Anglo American Corporation, 1993, for their Marshal Street offices in Johannesburg (Planning May 1993: 62-63).

The more recent developments in glass technology that affect windows have been 'smart glass' (not used in glass painting to date) and dichroic glass. Although dichroic glass is expensive and more often used for jewellery, its property of transmitting and reflecting different colours of light has been used effectively in stained glass windows.

The reawakening of interest in stained glass on the part of architects led to a heightened awareness of the possibilities of architectural art glass in general. Where architects' integration of stained glass was at first purely decorative, (cf. Mackintosh and Wright), Notre Dame du Haut, Ronchamp, displayed a fully conceptual integration of glass art into the architecture, last found in gothic cathedrals. In the twentieth century, glass art and architecture once again - even if rarely – reached an equal partnership in this relationship. This requires close, long-term collaboration between architect, artist-designer and master glass painter or glazier, whether in one or more persons. The artist-designer requires specialist knowledge of glass while the quality and a scale of workmanship required would usually occupy a glass studio for several years. The glass-painter, an artist in his own right, needs space for interpretation of the art and the artist and architect need to generate a concept together. These requirements have led to other types of close relationships between architects, artist and master-glaziers, producing wholes which are more than the sum of their parts.

Artists designing windows

In post-war France especially, noted artists such as Henri Matisse (1869-1954), Georges Rouault and Georges Braque designed stained glass windows (Moor 1989: 19). In Matisse's Vence

chapel, 1949-51, he designed the building, the artwork and the priests' vestments. Marc Chagall (1887-1985) engaged in an enduring relationship with the medium. Chagall had it executed by the gifted glass artist Charles Marq of Atelier Simon Marq in Reims, who had to develop new techniques to realize his floating designs which flaunted lead lines. They first collaborated on the. "twelve tribes" windows for the Hadassah hospital synagogue at Ein Kerem outside Jerusalem, 1960-62 (Bohm-Duchen 1998), and later on other projects such as the window for the United Nations building, New York, 1964 (figure 7).

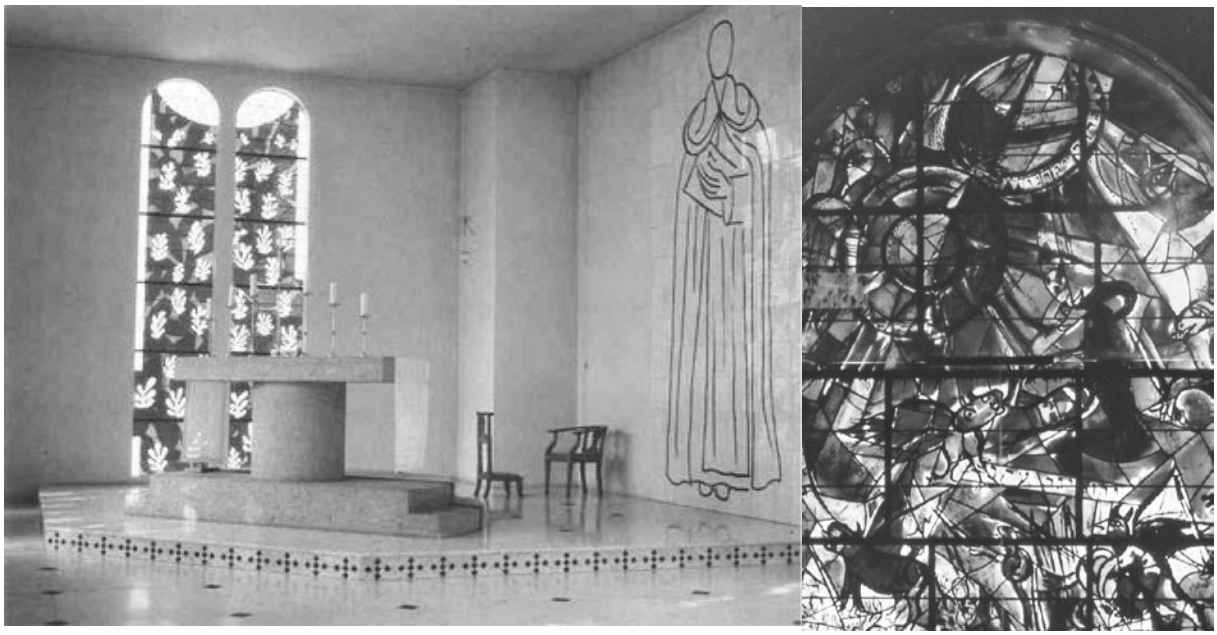

Figure 7
Windows by artists. Left: Henri Matisse, Rosary Chapel, Vence, 1949-51 (Anonymous f). Right: Marc Chagall, *Simeon,* Hadassah Synagogue, Jerusalem, 1962 (Anonymous 1980).

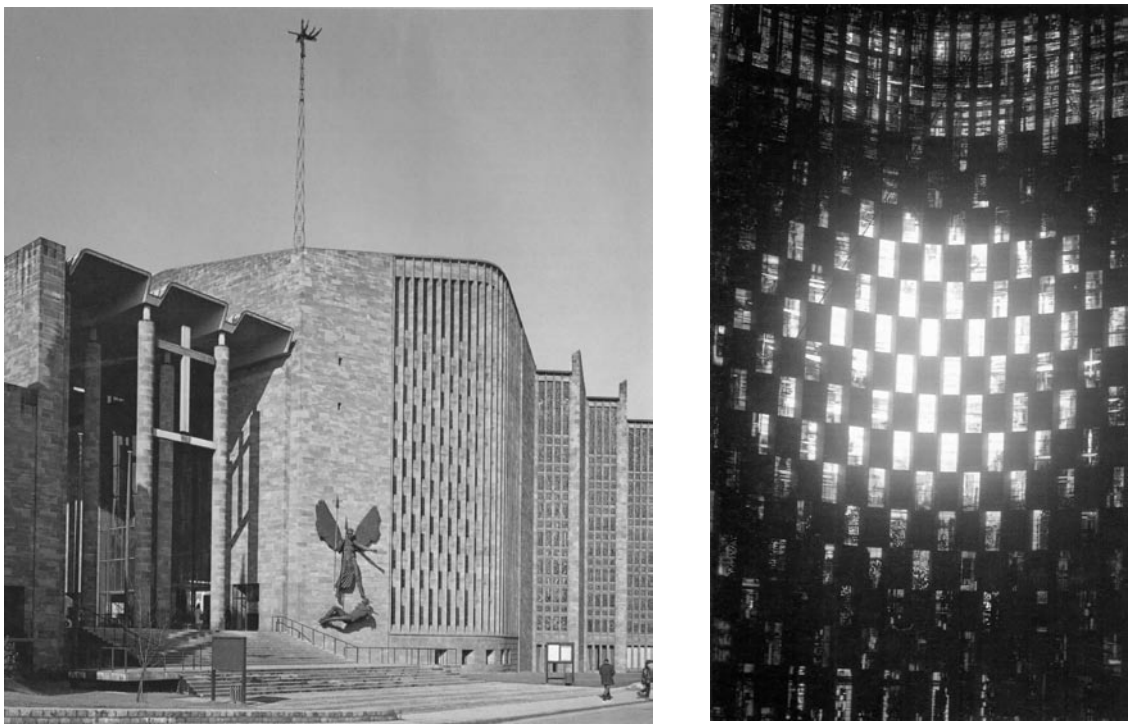

Figure 8
Left: Basil Spence, Entrance and baptistery wall, Coventry Cathedral, 1954-62 (Williams 1976: 22). Right: Interior view of baptistery wall, windows designed by John Piper and executed by Patrick Reyntiens, 1962 (Williams 1976: 20).

Another example of collaboration is Coventry Cathedral, 1954-1962, rebuilt after the war and designed by Basil Spence (1907-1976). Many different artists were employed for the different sets of windows (Williams 1976: 20-21). The great baptistery window (figure 8) was designed by the painter and printmaker John Piper (1903-1992) and executed by Patrick Reyntiens (born 1925).

The more traditional position where stained glass is separated from building design, still hold sway. This can cause frustration to both architects and artists, as glass, as an architectural material, has great potential to be used in creative and adventurous ways which are only possible if they can be collaboratively conceptualized at an early stage of the building design. A stained glass window put into a building afterwards can be as appropriate or inappropriate to the building as a canvas hung on a wall, and to maintain some congruity, the artist is forced to be servant to the architecture, which can be limiting to his expression. These frustrations and concerns were very clearly voiced by artists at the seminar on Glass in Architecture presented at Pilchuck Glass School in July 1994.

The emancipation of glass painting from architecture

The non-negotiable relationship between glass painting and windows as lasted until a century ago, because daylight was the only practical way of backlighting glass paintings. This had the great disadvantage that the painting was only visible from the inside, in daylight, and it remained an architectural fixture which could not easily be transferred.

The limitations imposed by daylight were eventually overcome with the invention of electric lighting, and notably fluorescent tube lighting, which could provide even white backlighting over a large area and make it possible to mount a glass painting in a light box on an interior wall and appreciate it at night. It also made a level of interior lighting possible in buildings which showcased stained glass to the outside, making for viable public and commercial applications. This both emancipated glass painting from architecture and encouraged the use of stained glass in architecture. In Germany, particularly, commercial banks promoted their image with walls of glass art, e.g. Ludwig Schaffrath's bank windows in Aachen, 1986 (figure 9). In many first world countries glass painters have been commissioned to produce work in airports, concert halls, etc. This tends to be modern, abstract work, and the emphasis is on communicating a cutting-edge fusion of technology and art, as opposed to the more traditional subject-matter of church windows.

Artificial backlighting as an only light source for glass paintings is still not popular with glass artists as two of the very unique features of stained glass are compromised, viz.
the fact that exterior light quality is constantly changing and the naturally backlit art work is in a dialogue with its environment, making it subtly different each time it is viewed, and
the fact that because the material can be fully transparent, makes a total integration possible of that which is inside the glass, on the surface of the glass and the view beyond the glass into a multi-dimensional image. An excellent example is the "floating" spirits etched in the clear glass west screen of Coventry Cathedral, by John Hutton (1906-78), 1962, seen against the background of the burned church ruins (figure 9).

The possibility of the light-boxed painting has, however, made glass painting more attractive to art collectors and made it possible for glass painters to have exhibitions rather than to wait for architectural commissions. An example is Debora Coombs' recent exhibition, October 2009, in London's Cochrane Gallery entitled "Menfolk" (Anonymous, g). It has made smaller, more affordable paintings viable, since stained glass has always been a very expensive technique,

both in terms of materials and a technique that requires overlays of numerous firings of different paints at high temperatures. After all that, the end product remains fragile, with the resulting higher risk to investors, but glass painting, formerly taught as a "decorative art" at the École des Beaux Arts, (Cousins 1989: 35) has earned its way back into the realm of fine art, emancipated from architecture and decoration.

Figure 9
Left: Ludwig Schaffrath: Bank, Aachen, Germany, 1986 (Moor 1989: 35).
Right: John Hutton: etched west screen, Coventry Cathedral, 1962 (Williams 1976: 8).

Glass techniques were always being developed on the commercial, decorative forefront leading to the studio glass movement on the west coast of the USA in the nineteen-sixties, where experimentation and collaboration between glass artists led to a cross-fertilization of ideas and a new surge of energy in the field of hot glass. This received a big impetus with the founding of the Pilchuck School of Glass art in 1971 (Herman 1992: 20) by Dale Chihuly (born 1941). Although hot glass was the first to be emancipated from decoration, the boundary between hot glass and flat glass became blurred as artists started to apply vessel-making techniques such as slumping and fusing to glass painting, making three-dimensional relief a part of stained glass. Although painting techniques and tools have remained virtually unchanged over centuries, the advent of computer-controlled kilns has removed many of the past limitations and a glass painter can now produce almost anything that can be envisaged, subject only to cost.

Stained glass artists themselves have been moving more and more in the direction of free-standing work, often three-dimensional and in tandem with other techniques. The annual exhibitions of the Women's International Stained Glass Workshop (Women's International Stained Glass Workshop undated) are a good example of stained glass as a fully-rounded means of expression. The Santander exhibition of Spanish stained glass from the gothic to the twentieth century in Madrid in 2001 (Fundacion Santander Central Hispano 2001) ended with interesting examples of free-standing stained glass by artists such as Pere and Lorena Valledeperez. The equestrian glass sculpture, 1998, at the Copenhagen airport done in collaboration between Norwegian painter Frans Widerberg (born 1934) and Danish glass artist Per Steen Hebsgaard (born 1948), shows how a glass painting becomes a slumped sculpture (figure 10). While stained glass artists have been moving into other dimensions, artists who would not describe

themselves as stained glass artists are increasingly combining glass painting techniques into their sculptures or collages, as evidenced by the participants in Pilchuck's artist-in residence programs which allow artists in other fields to come and work at glass painting techniques into their sculptures or collages, as evidenced by the participants in Pilchuck's artist-in residence programs which allow artists in other fields to come and work at the glass school and add glass techniques to their palettes (Herman 1992: 36).

Figure 10
Free standing glass painting. Left: *Desintegración,* Lorena Valldepérez, 2001, artist's collection (Santander 2001: 206). Centre: Pere Valldepérez, 2001, artist's collection (Santander 2001: 204). Right: Equestrian glass sculpture, slumped, fused, painted glass. Widerberg & Hebsgaard, Copenhagen airport, 1998 (Photo: Janse van Rensburg 2009).

Figure 11
Architectural glass art. Left: Trahan architects, cast glass door, Holy Rosary Church, St Amant's, 2003 (Anonymous, c). Right: Dale Chihuly, ceiling of Bellagio Casino, Las Vegas, 1986 (Anonymous, b).

A new fusion

This development of glass art in the freedom outside architecture has fed back into architectural glass. Glass artists' main lament is that architects are not always aware of the possibilities of

glass as an art medium which can double up as part of the building envelope. Examples of such artwork could be a sculptural door of cast glass, or Dale Chihuly's ceilings and floors of blown glass elements which give the illusion that one is living inside a tropical aquarium or an oriental carpet come alive. e.g. the ceiling of the Bellagio Casino, Las Vegas, 1986 (figure 11). These are architectural interventions that are less possible for an artist to add when the building has been completed.

Figure 12
Slumped glass roof: Zaha Hadid, Nordpark Cable Station, Innsbruck, 2008 (Anonymous h).

Finally, there are architects who are grasping the creative potential of glass as a sculptural building envelope as can be seen in Zaha Hadid's new Nordpark Cable Railway stations, Innsbruck 2008, with double curved slumped glass roof designs (figure 12). They are using art glass techniques at a very sophisticated architectural level, without yet crossing the divide between sculpture and painting.

The possibilities when painting, sculpture and architecture will become truly fused into built glass art are tremendously exciting and waiting to be explored by artists who have the courage to explore the interstices, encouraged by art patrons with vision. My hope is that within the next few years it will be possible to document such developments in South Africa as art history.

Internet references (Anonymous)

a, *Art and architecture - Københavns Lufthavne*. Available: http://www.cph.dk/CPH/UK/MAIN/Virtual+Airport/Art+and+architecture/ [2009, 11/25/2009].

b, *Bellagio Glass Artist Dale Chihuly's Work on Exhibit in Phoenix | Royallyflushed* . Available: http://www.royallyflushed.com/general/bellagio-glass-artist-dale-chihulys-work-on-exhibit-in-phoenix/ [2009, 11/24/2009].

c, *Cast Glass Architectural Projects - John Lewis Glass*. Available: http://www.johnlewisglass.com/glass-architectural-installations/architectural-glass-installations.html [2009, 11/24/2009].

d, *Encyclopedie des techniques - >Dalles de verre*. Available: http://annuaire.idverre.net:81/4daction/encyclo_aff_tech/70/-1 [2009, 10/5/2009].

e, *Google Image Result for http://blog.pennlive.com/thrive/2007/10/17.%20Dragonfly%20Library%20Lamp.jpg*. Available: http://images.google.co.za/imgres?imgurl=http://blog.pennlive.com/thrive/2007/10/17.%2520Dragonfly%2520Library%2520Lamp.jpg&imgrefurl=http://blog.pennlive.com/thrive/2007/10/tiffany_and_mucha_exhibits_at.html&usg=__n0WC93f_Y9I9jrgOSMGUuQmIRQI=&h=1387&w=1092&

sz=409&hl=en&start=39&tbnid=m8W5Jyk dO6sxVM:&tbnh=150&tbnw=118&prev=/ images?q=tiffany+lamp&gbv=2&ndsp=18&hl =en&client=firefox-a&rls=org.mozilla:en-US: official&sa=N&start=36 [2009, 11/27/2009] .

f, *matisse126-m.jpg (JPEG Image, 425x330 pixels)*. Available: http://www.namhak.com/ sungha/expressionism/matisse126-m.jpg [2009, 11/29/2009].

g, *Stained glass by Debora Coombs for religious and secular architecture, public art, exhibitions and collectors. Handpainted, kiln-fired stained glass commissions. Workshops and classes in stained glass design and glasspainting for students of all levels.* Available: http:// coombscriddle.com/ [2009, 11/24/2009].

h, *Zaha Hadid Architects - Nordpark Cable Railway :: arcspace.com*. Available: http:// www.arcspace.com/architects/hadid/nordpark/ nordpark.html [2009, 11/25/2009].

Works cited

Archer, M. 2005. *Stained Glass - the Pitkin guide.* Norwich: Jarrold Publishing.

Archer, M. 1985. *An Introduction to English Stained Glass.* Maryland: Stemmer House.

Bohm-Duchen, M. 1998. *Chagall.* London: Phaidon Press.

Cousins, M. 1995. *20th Century Glass.* London: Grange.

Fundacion Santander Central Hispano (ed) 2001. *La vidriera Espanola - Del gotico al siglo xxi*. Madrid: Sala de Exposiciones de la Fundacion Santander Central Hispano.

Grodecki, L. 1975. *La Sainte-Chapelle.* Paris: Caisse Nationale des Monuments Historiques et des Sites.

Herman, L. 1992. *Clearly Art - Pilchuck's Glass Legacy.* Whatcom Museum of History of Art.

Hirst, E., Pearce, J. & Tutton, M. (eds). 2007. *Windows: History, Repair and Conservation.* Dorset: Donhead.

Lassus, J. 1966. *The Early Christian and Byzantine World.* London: Paul Hamlyn.

Moor, A. 1989. *Contemporary Stained Glass.* London: Mitchell Beazley.

Panofsky, E. 1976. *Gothic Architecture and scholasticism.* New York: New American Library.

Planning, May 1993. *Architectural Sculptures: the work of Karl-Heinz Wilhelm*, issue 127. Saxonwold: Avonwold Publishing.

Women's International Stained Glass Workshop. No date. *Exhibition Catalogue: Wales Tales - Von Sonne, Sand und schwartzen Bergen*. Cardiff.

References

Chagall Jerusalem windows. 1980. Jerusalem: Hadassah Hospital.

Ariane Janse van Rensburg graduated in architecture from UCT. After winning the EPIA competition to design stained glass windows for the Feathermarket Hall, she had the opportunity to train in glass painting under Debora Coombs at the Pilchuck Glass School in Seattle. On her return she received her first large stained glass commission in Botswana and extended her design partnership to include a glass studio. She has actively practiced in architecture and stained glass ever since. She joined the full-time staff of the University of the Witwatersrand in 2008 where she teaches in Architectural Design and Theory. Her research interests and publications are mainly in the field of symbolism in stained glass, in which she has just completed a M.Arch. by Research at Wits.