The Conservation of the Fabric: The Leaded Windows of St Patrick’s Cathedral, Melbourne

The Roman Catholic cathedrals of Melbourne (1858) and Sydney (1879), two of six such commissions undertaken by William W. Wardell, are amongst the largest and greatest Gothic Revival cathedral buildings.

Wardell was able to see both these great edifices substantially completed during his lifetime, a rare occurrence in the history of cathedral building. The day before his death in November 1899, he had completed detail drawings for a side altar – his first work in this country – the masterpiece St. Patrick’s Cathedral, a church of ‘superb quality and feeling’.1 The fabric of St Patrick’s Cathedral has great intrinsic strength, testimony to Wardell’s belief that buildings should be for generations to come.

Like all buildings, St Patrick’s Cathedral has parts under greater stress and components more prone to destructive forces, than others. To curb the processes of decay, cathedrals have traditionally had small teams of skilled craftspeople permanently employed under the leadership of a cathedral architect to carry out preventative maintenance. Today not all cathedrals are as fortunate as York Minster, Kiln Dom (Cologne) or Lincoln Cathedral, to be able to afford the teams of masons, roofers and glaziers. However, almost all European cathedrals employ a cathedral architect to carry out regular inspections and organise programs of preventative measures, thereby minimising intervention. In England, it is a statutory requirement to employ a ‘Surveyor of the Fabric’ who is preferably a member of the Cathedral Architects Association, and has achieved a certain level of experience within the field of conservation.

With the exception of the extension of the new sanctuary in preparation for the 1974 Eucharistic Congress, in the 21 years that our office has been associated with St Patrick’s Cathedral, work to the fabric has almost always been in response to emergencies. We have been summoned on to the roofs with the maintenance plumber many times – to investigate the source(s) of overnight flooding to the interior, or collapse of yet another small piece of stone. Problem areas generally, have been monitored and an ongoing maintenance program implemented. There have been insufficient funds available for this maintenance program to be anything more than a stop gap, or a holding operation. Prior to our involvement, maintenance seems to have been of the ‘do-it-yourself’ or ad hoc approach. Products such as Portland cement, mastics, silicon sealants, plasti-bond and wire were commonly used. In many instances, these materials have caused more problems than they intended to solve.

As early as 1977 recommendations were made to the Archdiocese for a thorough survey of the fabric of St Patrick’s Cathedral, in order to gain an understanding of the severity of deterioration. The first fund-raising exercise was prompted in 1981 by a stone pinnacle which fell from the clerestory parapet, causing a substantial indentation in the aisle roof below. Unfortunately this appeal was not very successful, but did provide sufficient funds for rescuing and securing stone pinnacles to the upper parapets of the nave and other precariously poised masonry.
With the support of Father Chamberlin, the then Dean of the cathedral, it became possible to undertake independent research on all aspects of the fabric with a view to establishing the areas in need of most urgent attention. Included in our investigations were the components of the fabric, including services, but also day-to-day housekeeping procedures and certain management practices.

The tenets of good conservation practice require a thorough understanding of the significance and characteristics of the building being addressed, so that a comprehensive program can be set, relevant to that particular building, and which enhances its significance. Such an analysis was not formally prepared into a reference document. However, considerable documentary research was undertaken to appreciate the sequences of change, the background or contexts of change, its significance and any other relevant information with regard to the cathedral building and its context. The building itself, however, remained our principal source of information.

Our responsibility lies foremost with the fabric of the cathedral, and it is the planning stage that is critical in a conservation project. It is the point at which parameters are set and principles adopted. Principles need to be established, taking into account the needs of the fabric but also the needs of the owner, and then the needs (or wants) of the community.

The ideal approach when considering the fabric is minimum intervention. However this is not always practicable. For example, in high and inaccessible areas enough works need to be carried out so the fabric needs no attention for more than 50 years, saving the owner (custodian) a considerable amount in the long term. Obviously in more accessible areas, a less interventionist approach can be taken. Although the danger of doing too little must be avoided. One of the general principles adopted for the conservation works at St Patrick’s Cathedral was that we must be prepared to ‘buy’ time in the hope that better methods will become available. Therefore, techniques used on the windows in particular, must be reversible.

As a result of the survey and research on the fabric’s history, recommendations were made to the newly-formed Cathedral Works Committee to undertake works in four stages. Stages one and two addressed urgent works to the exterior. Stage three, the less urgent works and the interior. Stage four (if there are sufficient funds available) will address enhancement works. Conservation management policies for stages one and two were established based on previously established principles. This formed the basis for all decisions.

The condition of the fabric varied from very good to poor. The evidence of the survey indicated that many of the ubiquitous symptoms of weathering, deterioration and decay were present in the fabric.

The reason for the first stages of the works was to reduce the rate of decay, to minimise the effects on the fabric from the elements – water, wind and fire. Our
intention was to conserve the fabric. Restoration, preservation, reconstruction and adaptation are processes which may be adopted as part of the conservation process. These are clearly defined in the Burra Charter.

The roofs and walls, the structural components, needed attention first. The windows, in our approach, were considered part of the fabric of the walls — without walls, there cannot be windows.

The roofs and roof plumbing needed substantial work to rectify corrosion and stress failure in flashings, gutters and other rainwater goods. The level of corrosion was mainly due to the large number of electrolytically incompatible materials used for repairs. The roofs were likened to a 'glorified battery'.

The masonry to the upper levels, in particular the ornamental work to the sandstone around the apse and chevet chapels, had bedding joints totally washed or blown away. In a number of cases the pinnacles supported by their bronze dowel alone, were literally swaying in the wind.

In terms of priorities, it must be understood that human life is foremost, whether the property is of intrinsic value or not. Fire, more than any other process of destruction, threatens life as well as the historic fabric and contents of the cathedral. The relatively recent fires at Cairn Memorial Church, East Melbourne, York Minster, UK, those in the French cathedrals of Nante and Maline, and the substantial losses at Hampton Court Palace and Windsor Castle, increased our concerns in this area. Lightning strike, arson, electrical failure, smokers and workers are the factors most likely to increase the risk of fire.

**The Windows**

For the assessment of the leadlight and stained-glass windows we employed a glass consultant, Mr David Beavis of Grenfell, NSW. He prepared a thorough and useable document identifying all the problems of the glass. Contract documents were prepared on the basis of the Beavis Report and tenders were called for. Our documents were used to promote a competitive tendering process, so that ‘apples could be compared with apples’. Doug Jewel and Geoff Wallace of Benalla won the contract. Bill Gleeson agreed to act as our glass consultant during the works. As each section of the work was about to commence, Mr Gleeson, the contractors and our office reviewed the scope of work to each window. A consensus was reached prior to the commencement of any work. Given the scale of the first stage, there were a few inconsistencies in our contract documents which needed reviewing.

All but three of the stained-glass windows are from the Hardman Powell Studios, Birmingham, UK, dating from about 1861 to 1910. The small Montgomery window can be found along the Sacristy Corridor and two Franz Mayer windows are in the Blessed Sacrament Chapel.
The Mayer windows date from 1881. These were apparently bought by the Archbishop Gould at the Melbourne International Exhibition of that year. The Mayer Studio still exists as a family business in Munich. The Mayer windows were sent back to the Mayer studios for conservation. This was a donation from Melbourne’s German community and the Archdiocese of Munich to the Catholic Archdiocese of Melbourne. These windows have now been returned and installed in their original position.

**Window Structure**

Stone traceries: the structural integrity of sandstone traceries to the windows was generally sound. Some repointing of the dressings needed to be carried out to reduce the water penetration and the eventual decay of the stone.

**Mortar Fillets**

The mortar fillets between the leaded frame and the traceries had deteriorated in more than half of the windows. Many of the mortar fillets had been replaced in the past using a mortar which is too hard. In other cases linseed putty had been used to replace mortar fillets which had failed. The mortar fillets not only help to stop water and draughts from entering the building, but also offer considerable lateral support to the window frames. The composition of the new mortar should match as closely as possible the original mortar composition to reduce the possibility of harmful effects to the stone traceries. It is far better that the mortar fails than the stone tracery. This work was carried out by a skilled mason.

**Ferramenta**

The ferramenta, the metal support system on which the leaded glass depends for its strength, at St Patrick’s are unusual in that they are fitted externally to the windows and are decorative elements. The ferramenta are leaded into the stonework. The leading-in was generally in good condition. Corrosion of the metalwork in some cases had exploded the stone in which it is bedded. In these cases the stone is cut away and a new piece indented after the corrosion to the metalwork has been removed and the ferramenta galvanised. The ferramenta is then painted to match the original.

Much of the deterioration and/or collapse of the windows was caused by excessive movement due to economy in the use of supports. Additional saddle bars, where required, were fitted on the inside of the window so that they do not detract from the appearance of the existing decorative ferramenta. Traditionally, saddle bars are fitted internally so that the bars can provide lateral support to the panel against wind loads. As the ferramenta at the St Patrick’s windows is placed externally, the wind load is taken up by the copper ties rather than across all of the saddle bar, thus the common occurrence of copper tie failure.
Almost all of the frames to the existing ventilation hoppers within the leadlights had failed, and all were replaced in stainless steel.

**Glass Panels**

**Lead Cames**

The Beavis Report identified substantial corrosion, crystallisation and general deterioration of the lead cames and solder join failure due to the continual movement (thermal and vibration due to wind). As all lead cames relax and deteriorate, all glass panels require re-leading at some time. However, present thinking in conservation circles favours the retention of lead cames wherever possible, the glass quarries cleaned in situ and any strengthening carried out with sympathy and restraint.

The approach taken was to totally remove only those lancets which had more than 25 per cent of solder joint failure or lead crystallisation evident. In some cases only one panel in a lancet was removed for re-leading. New lead cames were manufactured to match as closely as possible the existing lead in terms of the constituent parts, as was the solder. The cross section of the lead cames was also made to match that of the original. It must be kept in mind that the windows were of different dates, therefore their composition and sections did vary a little. A decision was made, however, that the profile of the lead cames should be visibly different from that of the existing one. Those panels with less than 24 per cent of solder joint failure were carefully soldered in situ from both sides.

The properties of a good leadlight cement are that it is relatively easy to apply, should set relatively quickly and for many years should remain flexible enough to accommodate slight movement of the panel without falling out. Traditional cements contained white or red lead in the mix. This practice has been discontinued for health reasons, therefore the new cement does not exactly match the original cement.

Cleaning methods need to be considered carefully as some methods are highly controversial. One school of thought argues that it is preferable to leave the windows in their dirty condition so the ambience of the interior is not dramatically altered. Also, by cleaning the windows they are open to new attack, more so than if left untouched. The contrary opinion argues that if grime and salt remain on the glass and lead, they will react with moisture through condensation and an acceleration of decay will occur.

The decision was taken to clean the windows, initially with only warm water. A pH-neutral detergent was used on the outside of some windows in an attempt to achieve an even level of cleanliness. Soft, natural-bristle brushes were used on the leadlights. As the Hardman windows include some paints made with a soluble borax flux, all the stained glass was cleaned only with dry, natural-bristle brushes. No detergents were used on the interior or exterior surfaces of
the stained glass. But here it was not necessary. Stubborn grime and deposits can be cleaned using glass-fibre brushes. This sort of mechanical cleaning method needs to be carried out by skilled operators in situ or over the bench.

The Beavis Report identified areas of solarisation causing iridescence and minor weathering of the glass. Little is known about these processes but it is understood that they are irreversible. We have recorded these and they will be monitored.

**Quarry Repairs**

A considerable number of quarries (individual panes of glass) were found to be cracked. Some had totally fallen out. This sort of damage is obviously more significant in the case of a painted window than a coloured diamond light.

Coloured glass to match the existing amber glass was made by Toucan Glass Studios (David Turner). Fortunately there were no lost quarries in the painted windows in the first stage of the works. However there were a small number in the second stage. These were generally in the borders, foliage, or the architecture, and as such will be relatively easy to reconstruct.

Physical rather than chemical bonds are preferable between broken pieces of painted glass. Repairs to breaks which are not on sensitive areas can be made with mending leads.

Sensitive areas were treated in one of two ways. The Franz Mayer studio, under professional instruction, repaired such breaks using self-adhesive copper foils.
In the case of St Patrick's, as the window was not going to be removed, it was decided to provide a back plate to the broken piece. In this way the two pieces would not be ground against each other and the whole quarry would be stiffened. It is also important to ensure that adequate ventilation is provided between the two pieces of glass to reduce the risk of condensation. Note that silicones release acetic acid on curing, which causes corrosion of lead.

**Paint Loss**

Another problem identified by the Beavis Report was that of paint loss from the painted windows. Paint loss was evident on most of the windows in the cathedral to a lesser or greater degree. Beavis suggests that the paint loss was largely due to condensation. However, paint loss is also caused by under-firing, the use of certain fluxes, inadequate flux, or inappropriate cleaning. At this time paint loss is being recorded and monitored. We were considering the use of acrylic polymer resins for paint consolidation, but again we do not know enough about these methods.

**External Protection**

External protection is used to protect the glass from vandalism, to conserve or protect fragile glass from weather and the atmosphere, or to lessen the effects of extreme fluctuations of temperature and relative humidity, as in the case of isothermal glazing.

The clerestory windows do not have any external protection, but the windows to the west front and those to the chapels do. At St Patrick’s Cathedral, we will
End Notes

2 Refer to the Burra Charter prepared by Australia ICOMOS

Figure 10 Crack across face of St Patrick after repair with back plating. Refer to figures 4 & 5. Handman Powell window. (Photograph: Author).

replace existing galvanised wire guards with stainless steel wire guards. The stainless steel will be burnished to remove the shine from the stainless steel wire. Polycarbonate or glass sheet, when viewed from the street casts reflections when the building is viewed from the outside. This visual impairment far outweighs any benefits such systems offer.