INFORM

DOMESTIC DECORATIVE GLASS

HISTORIC ENVIRONMENT SCOTLAND
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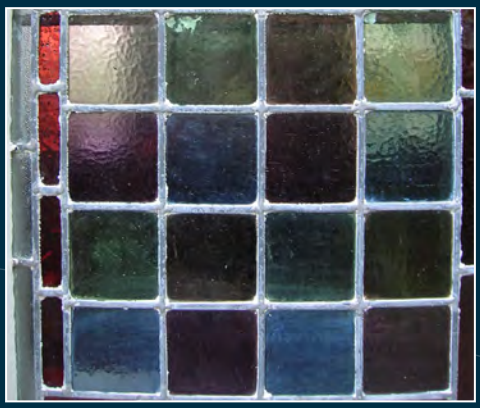

Fig. 1: Multi-coloured glass with each piece made using a different chemical element.

Fig. 2: Decorative glass door panel in the Glasgow School of Art. © SCRAN. Licensor www.scran.ac.uk.

DOMESTIC DECORATIVE GLASS

Whilst fundamentally serving a functional purpose to allow light into a property, domestic glass can be a key decorative element of any building in which it is found. Glassmaking of various styles and techniques is an art which is thousands of years old. This INFORM guide will focus on 19th and 20th century domestic glass. The purpose is to illustrate the types of decorative glass likely to be found in Scottish buildings and to highlight repair and maintenance issues.

Decorative glass types
Glass can be manufactured to be decorative or altered afterwards. It can be etched, coloured, engraved or rolled to produce ornamental surfaces. While stained glass is often used as a generic term to describe all forms of coloured glass, only glass which has been stained or painted after its initial manufacture is 'true' stained glass.

Coloured glass
Glass can be coloured in the original manufacturing process. This is achieved through the addition of chemicals to achieve specific colours. For example, Cobalt produces blues and Manganese produces a purple colouration (Fig. 1). To ensure depth of colour and consistency, it involves a highly skilled process.

Stained glass
Stained glass has a coloured material applied to its surface and is usually fired in a kiln to ensure a more robust finish (Fig. 2). Silver stain (silver sulphides and nitrates) has been commonly used since the 14th century to give yellow and orange colours on clear glass. Enamels were also used as early as the 6th century and by the 16th century the processes started to incorporate a range of metal oxides to give a much broader colour palette.

Etched glass
Etched glass was introduced in the latter half of the 19th century and was developed to provide a highly detailed decorative finish, using techniques which are commonly still in use today. Etching is undertaken by blasting an abrasive material against the surface of the glass through a stencil to

Fig. 3: An elaborate design etched into glass.

Fig. 4: A late 1930s design that features both engraving and etching. © University of Strathclyde. Licensor www.scran.ac.uk.

achieve the desired effect. It can also be done by using hydrofluoric acid and protecting those areas which are not to be etched by the application of a stencilled layer. The emerging frosted surface from both techniques allows for a degree of privacy, whilst also creating a diffused lighting effect to the interior (Fig. 3).

Engraved glass

Exercising a high degree of skill, engravers used rotary grinding wheels to carve a range of designs, from delicate lines to shaded patterns, and of various profiles (square, round and mitred). This approach was particularly popular in the late 19th Century and often used in conjunction with etched glass (Fig. 4).

Rolled glass

The technique of running hot glass through shaped rollers enabled a variety of regular patterns to be formed on the surface. This allowed many geometric forms, as well as natural motifs of leaves and plants, to be easily created and mass produced (Fig. 5). As original glass should be retained whenever possible, care needs to be taken not to mistake the original material for modern replacement glass. It is recognised, however, that some patterns may not be readily available, if there is a need to replace broken panes. In such cases, the nearest pattern to the original should be chosen (Fig. 6).

Decorative glass panels

A range of techniques have been used in the making of stained or coloured glass. Initially, a full-scale drawing of the design (known as a cartoon) is made to identify the glass components, framework and supports. Most coloured or stained glass designed windows were put together

Fig. 5: Leaves pressed into the glass using rollers. The pattern is likely from the mid-20th century.

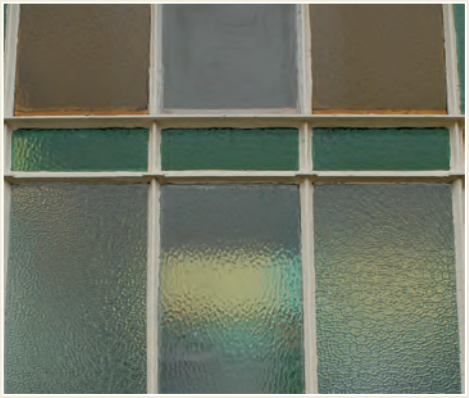

Fig. 6: Window made up of differently-aged panes, attempting to match the original pattern (likely to be the green panes at the upper middle).

Fig. 7: The glass design is laid out in the workshop prior to being fixed together.

using a framework manufactured from 'cames'. These were usually made from lead (which is very workable), but sometimes other metals such as zinc have been used. The cames have an H cross-section, which accepts glass into both the grooves; these are then closed over to securely grip the glass. Traditionally, rounded section cames were used, as they were considered to be more resilient. In more recent times, flatter sectioned cames have been used more frequently, as they are easier to work. Each piece of appropriately coloured glass is cut to match the designer's intent in the cartoon, whilst leaving space for the surrounding cames.

Some of the individual glass components may be painted and subsequently fired in a kiln. The complete set of individual components is then laid out on the cartoon so they could be pieced together (Fig. 7).

The joints between the lead cames are then soldered together, which is a highly skilled job. Once assembled, a sealant is applied over the panel to seal all the joints between the cames and glass. Copper wires are then soldered to the cames to allow the panels to be fixed to horizontal supports called saddle bars. These bars are then built into the surrounding timber frame or masonry to secure the panel. Saddle bars were traditionally made of iron, but craftspeople now increasingly utilise more corrosion resistant materials, such as bronze. In a domestic dwelling, the entire assembly is normally fixed into a wooden frame to be secured as a window or a decorative door panel (Fig. 8).

Fig. 8: Decorative glass fixed in a timber framed window.

Repair and maintenance

Lead came joints can become loose or disturbed over time and good repair and maintenance relies on the building owner getting into the habit of making frequent inspections. Early identification of problems and quick remedial work can ensure less damage to the glass and lower maintenance costs. It is recommended that good-quality photographs of any surviving historic decorative glass are taken wherever possible and kept for future reference, should serious damage occur.

There are three elements which are susceptible to damage – the glass itself, the applied surface decoration and the structure supporting the glass (i.e. cames, saddle bars or frames).

Deterioration of the glass itself is uncommon, unless a manufacturing defect is involved. Surface dirt can be an issue when debris is deposited and left uncleaned, eventually dulling the glass itself.

Air pollution can cause deterioration of the glass surface by the weak acids that can be formed on it. Over a prolonged period, ultraviolet light can also cause changes in the glass chemistry and colour through direct exposure to sunlight.

Like many other building materials, decorative glass is also most at risk from water in the form of rain, condensation and relative humidity, which can accelerate the rate of decay. Combined with deposits of dirt, it can also encourage biological growth, which further attacks the decorative surfaces. Extreme care should be taken when cleaning painted glass; harsh detergents should not be used.

Fig. 9: A stress fracture in a pane of glass.

Coloured or rolled glass should be carefully cleaned using water and a soft cloth. Stained glass should only be cleaned by a suitably experienced conservator, since the stability of the applied staining could be at risk.

Loose or rattling glass is an early indicator of a potentially more serious problem. This should be fixed as soon as possible, particularly where the glass is part of a door or window and subject to regular movement. Care should always be taken not to slam windows or doors containing decorative glass. If a door or window is tight or swollen, the fit should be corrected by a competent joiner before damage to the glass occurs.

Direct impact on the glass, or stress occurring due to structural movement and vibration, are the most common causes of breakage (Fig. 9). Where glass has been broken, the retention of the original material is important, especially if it is decorated. In many instances, broken glass can be repaired by a specialist using epoxy-based materials especially developed for the purpose. As the original colours are unlikely to be fully matched, replacement glass should always be thought of as a last resort.

Thermal movement caused by natural differences in the materials can also be a problem. Although some degree

Fig. 10: This secondary glazing has become very unsightly due to corrosion from high moisture levels.

of movement of the glass panel will be taken up within the cames, the full frame should have some room for the expansion and contraction to take place. Over time, this can cause a basic failure of the window assembly and it should be regularly checked to identify early repair needs.

The lead used in making cames is also subject to a slow rate of corrosion. A white powdered appearance on the surface indicates that some corrosion has started. This will accelerate in an acidic and saltwater environment. Soldered joints may also break apart, or the surface sealant between the glass and cames can be worn away or washed out over time. The accumulated weight of glass within a frame can also be significant. The supports must be structurally sound and able to carry the full load of the leaded and stained glass. Saddle bars can come loose or become detached from the frame when the ties are broken or loose. The window can then buckle and deform under its own weight, as it is inadequately supported. Once identified, these defects should receive early attention to stop them from escalating in need and repair cost. The advice of a specialist should be sought as, in extreme cases, it may be necessary to remove the entire window, disassemble its parts, install new cames and reassemble it.

Secondary protection systems

As a method of attempting to protect historic glass and improving energy efficiency, secondary glazing is not an ideal solution. The addition of a secondary layer of glass or polycarbonate material can cause significant problems by creating a microclimate, where the environment between the glass and the secondary glazing is altered, in comparison to the surrounding atmosphere. Moisture levels and temperature ranges can fluctuate more widely than normal, due to a greenhouse effect. In many cases, this can lead to accelerated decay. Crude installations are also unsightly and restrict natural ventilation, whilst providing little thermal gain (Fig. 10). The advice of a specialist will be required to help overcome such difficulties.

Conclusion

Decorative glass from the 19th and 20th century can vary in appearance and decoration techniques. Care should be taken in the identification of historic glass; any such examples of historic decoration should be protected and maintained. Decorative glass can be susceptible to damage, so regular inspections should be carried out to identify problems early. While secondary glazing is often installed to provide protection, it should be carefully considered to prevent premature corrosion or damage to the glass and fixings. Specialist advice should be sought where appropriate.

Further reading

Scotland's Listed Buildings: What Listing Means to Owners and Occupiers, Historic Scotland (2006).

The Repair of Wood Windows, Technical Pamphlet 13, SPAB (1992).

Domestic Decorative Glass – History, manufacture and conservation of decorative glass, Glasgow West Conservation Trust Manual (2001).

'The preservation and repair of historic stained and leaded glass', *Preservation Brief 33*, Department of the Interior, National Park Service (1993). https://www.nps.gov/tps/how-to-preserve/briefs/33-stained-leaded-glass.htm

Further information

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