

The art of making of stain glass windows history essay



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As the stained glass window in St Dympna's church was the primary reason for me choosing the building to do my investigative report on. I decided that it would only be right to do my conservation report on stained glass windows. As the window in St Dympna's church is in first class condition, I came to the conclusion that for this report I would look at the different ways a stain glass window can be damaged and the most common restoration methods for restoring a stain glass window to its former glory. Firstly though I would like to write a brief note on the history of the stained glass window in St Dympna's Church Co. Carlow.

The window was manufactured by August Weckbecker. Professor August Weckbecker was a famous German sculptor who in the early 1920s agreed with the then parish priest of Killeshin/Graiguecullen Fr Michael Bolger to undertake the project of manufacturing and installing the large stained glass window on the north wall of St. Dympna's Church. The stained glass window is one of only three specimens that professor Weckbecker undertook in Ireland. This fact alone would make the stain glass window historically valuable.

August Weckbecker was so highly regarded in his field of sculpturing that he produced work for King Alfonso XIII (1886-1931) the King of Spain, King Ludwig III (1845-1921) the King of Bavaria, Pope Benedict XV And Pope Pius XI.

The Art of making of Stain Glass Windows

The technology for making glass dates back at least 5, 000 years, and some form of stained glass was used in European Christian churches by the third
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or fourth century A. D. The art of stained glass flowered in the 12th century with the rise of the Gothic cathedral. Stained glass has had various levels of popularity throughout history. The 12th and 13th centuries in Europe have been designated as the Golden Age of Stained Glass. However, during the Renaissance period, stained glass was replaced with painted glass, and by the 18th century it was rarely, if ever, used or made according to medieval methods. During the second half of the 19th century, European artists rediscovered how to design and work glass according to medieval principles, and large quantities of stained glass windows were made.

Materials

Glass is made by fusing together some form of silica such as sand, an alkali such as potash or soda, and lime or lead oxide. The color is produced by adding a metallic oxide to the raw materials.

Copper oxide, under different conditions, produces ruby, blue, or green colors in glass. Cobalt is usually used to produce most shades of blues. Green shades can also be obtained from the addition of chromium and iron oxide. Golden glass is sometimes colored with uranium, cadmium sulfide, or titanium, and there are fine selenium yellows as well as vermilion.

The manufacturing process

Stained glass is still made the same way it was back in the Middle Ages and comes in various forms. For the glass used in leaded glass windows, a lump of the molten glass is caught up at one end of a blow pipe, blown into a cylinder, cut, flattened and cooled.

Cathedral glass is rolled into flat sheets. This results in a somewhat monotonous regularity of texture and thickness. Other similarly made glasses are referred to as marine antique, but have a more bubbly texture.

Processing the stained glass

Large manufacturers of stained glass mix the batch of raw materials, including alkaline fluxes and stabilizing agents, in huge mixers. The mix is then melted in a modern furnace at 2500°F (1371°C). Each ingredient must be carefully measured and weighed according to a calculated formula, in order to produce the appropriate color. For cathedral glass, the molten glass is ladled into a machine that rolls the glass into 3.2 mm thick sheets. The sheets are then cooled in a special furnace called an annealing lehr. There are hundreds of colors, tints, and patterns available, as well as a number of different textures of cathedral glass.

Creating the window pattern

Though some of the tools to make stained glass windows have been improved, the windows are still hand crafted as they were centuries ago. The first step of the process involves the artist creating a small scale version of the final design. After the design has been approved, the craftsman takes measurements or templates of the actual window openings to create a pattern. This pattern is usually drawn on cardboard and is the actual size of the spaces to be filled with glass.

Next a full-sized drawing called the cartoon is prepared in black and white. From the cartoon, the cutline and pattern drawings are made. The modern cutline drawing is a careful, exact tracing of the leadlines of the cartoon on

heavy paper. The leadlines are the outlines of the shapes for patterns to which the glass is to be cut.

It is cut along the black or lead lines with double-bladed scissors or a knife which, as it passes through the middle of the black lines, simultaneously cuts away a narrow strip of paper, thus allowing sufficient space between the segment of glass for the core of the grooved lead. This core is the supporting wall between the upper and lower flanges of the lead.

Cutting and painting

After the glass has been cut, the main outlines of the cartoon are painted on each piece of glass with special paint, called “ vitrifiable” paint. This becomes glassy when heated. The painted pieces are fired in the kiln at least once to fuse the paint and glass.

Glazing and leading

The next step is glazing. The cutline drawing is spread out on a table and narrow strips of wood called laths are nailed down along two edges of the drawing to form a right angle. Long strips of grooved lead are placed along the inside of the laths. The piece of glass belonging in the angle is fitted into the grooves. A strip of narrow lead is fitted around the exposed edge or edges and the next required segment slipped into the groove on the other side of the narrow lead. This is continued until each piece has been inserted into the leads in its proper place according to the outline drawing beneath.

Finishing

The many joints formed by the leading are then soldered on both sides and the entire window is waterproofed. After the completed window has been thoroughly inspected in the light, they are secured with reinforcing bars

The process for making an entire stained glass window can take anywhere from seven to ten weeks, since everything must be done by hand.

Factors Resulting in Deterioration

The primary factors for the deterioration of stain glass windows can be put into the following categories glass, Lead, Paint, cement and putty window structure and over exposure

Glass

Each sheet of man-made traditional glass or cathedral glass is special, and may contain tiny bubble, skeletal criss-cross lines, and a range of textures. These should not be mistaken as errors, as they have been chosen for their result by the designer. The following are clear signs of deterioration cracking in the glass this may mean one of two things either the either the window is being troubled by internal stress and external stress.

Internal stresses are caused when the support of the window frame is not adequate and it puts added pressure on the glass, it can also be from impact be that either accidental or vandalism. External stress is generally associated with weather conditions i. e. over exposure to sunshine, rain or wind.

Lead

Lead is by nature yielding, flexible and easily soldered. This means that it can also slump easily and lose its structural role. External signs of failure to look out for are: bulging or bowing of the window, cracking along the face of the lead and a white, chalky specking on the surface.

Paint

The original furnace firing of the dye is not always successful, and inadequately-fired paint can be very susceptible and fragile, looking light and thin as the surface is gently washed away over time. Excessive-fired paint looks hard and splintered on the facade, attracts moisture, and eventually blisters and peels off.

Putty and cement

Overtime, the waterproofing compounds used to seal a structure go solid, crack, and fall out, leaving the lead and glass helpless against water damage, if it is external. At this point the window may be seen to be leaking – letting in water between the lead and the glass.

Window structure

If the window or panel is slumping and bulging, it may be due to poor installation methods which have left it lacking adequate support from the frame or the ties.

Over exposure

If the window is exposed to a large amount of sunshine rain or wind it can have an adverse result on the glass thus affecting the aesthetics of the window, by discoloration or leaking etc.

Restoration and Maintenance

Bracing – All large leaded stained glass windows require steel reinforcement bracing to support the weight of the window and to help keep it upright and rigid. Older stained glass windows frequently require repair to their original bracing or further supportive bracing.

Bulge Straightening – The twisting and bulging of a stained glass window is the loss of perpendicular alignment of the glass panel when weight loads of the window shift. Left unattended the bulges will usually worsen, causing the cracking or shattering of glass and pressuring the lead joints to stretch and break. Correcting the window bulges can be done by heating the lead with a welding torch till it is red-hot, the neighbouring spots are cooled by pieces of damp cloth that are constantly kept wet, so that the heat is not abstracted. The heated material is compacted, so that it will not expand to the sides. When cooling down, it shrinks in the compressed spot – the bulging disappears.

Glass Replacement – when it is essential to replace glass in a stain glass window it is imperative that the closest possible match is found to the original glass, so that the aesthetics of the window will remain intact as much as possible.

Re-Cementing – Stained glass windows derive much of their strength from the cement grout which fills in the lead tracks around the glass edges.

Driving rains, time, and the extremes of temperature cause a loss of the waterproofing cement – especially on the exterior side. The process of re-cementing replaces missing window grout, refurbishes the lead, and restores the shine to the window.

Re-leading – In this process the stained glass window is completely dismantled. The broken and mismatched glass is replaced. The window is completely rebuilt with new lead.

Isothermal Glazing

While window guards provide protection from mechanical damage, protective glazing can shield a window from wind and weather. Isothermal glazing, is a modern technique of protective glazing, relieves the historic glass from its function as a weathershield by inserting a ventilated protective glazing system. The original glass is protected by a window of clear glass and sufficient gaps are left at the bottom and top to allow for a chimney effect causing the space between the two to be ventilated. This system regulates the temperature on both sides of the historic glass panels and the occurrence of condensation.

Maintenance

Cleaning

Stain glass windows should not be wet-cleaned on the inner surface as water can do extreme harm to the glass, the lead, the putty, the paint, and the

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metal components. Even with an interior panel, dusting with a very soft bristle brush is better than using a liquid method. Often a single crack within a glass panel may be a tell-tale sign of other internal stresses, which may be due to lead fatigue or inadequate support.

Protection

Another part of the maintenance of historic and stained glass windows is assessing the danger to them. If there are cases of vandalism or break-ins in the neighbourhood the windows might need external protection, but the type of protection needs careful consideration too. It might also be very useful to prepare an action plan for unforeseen emergencies, such as fires, or storms.

Case study

Canterbury Cathedral

An immense wealth of stained glass can be seen throughout Canterbury Cathedral. Many of its jewel-like medallion windows survive from the late 12th and early 13th centuries. The Miracle Windows depict stories often involving ordinary local people, whose names are still known today.

Canterbury Cathedral also has a number of important Victorian windows, as well as 20th century works including the vivid stained glass crafted by Erwin Bossanyi in 1957.

The oldest window

The oldest window at Canterbury shows Adam delving. It dates to about 1176 AD and is the first in a series of ancestors of Christ that used to fill the

clerestory of the quire. In the 18th century these early windows were moved to the West Window and to the South-West Window. Adam delving now lives in the centre of the bottom tier of the West Window. The panels that can be seen in the quire clerestory today are 19th century copies of the originals.

Restoration and Conservation

Like most other historic glazing in the country, the famous late 12th and 13th – century windows suffered substantially through iconoclasm, vandalism, neglect and environmental impact.

After a long period of decline, the first stained glass restoration studio of its kind was established in Canterbury cathedral in the early 19th century. The damaged windows were repaired, missing elements reconstructed, and new windows were made in the mosaic style of the late 12th and early 13th centuries.

Today, the cathedral has its own stained glass conservation studio.

Established in 1973, it has a team of seven highly trained conservators. The emphasis now is on the consolidation of the fragile glass and its painted decoration, and on preventive conservation by installing protective glazing.

The studio has become a centre of excellence in stained glass conservation and restoration, and also works on the windows of other churches and cathedrals around the country. The team considers ecclesiastical and private commissions and will advise and help in all matters concerning the creation of new and the restoration/conservation of historic stained glass and lead light glazing.

The conservation process

Stained Glass Conservation today follows ethical guidelines that are completely different, sometimes directly contradictory to those of the past. Priority is now given to the historical material – glass, lead and ironwork, all of which are respected equally as part of the object and kept as long as possible.

All work has to be reversible and all interventions and materials are recorded for future generations.

1. The glass is carefully cleaned
2. Then glass, paint pigments and leadwork are consolidated and stabilized
3. All work is recorded
4. Protective glazing is designed and made for the historic window

Conclusion

Whilst undertaking this project it became very apparent to me that the art of restoring a stain glass window is a extremely gifted one that needs a whole variety of skills, it also became very clear to me the most trouble-free way to restore your window is in fact to keep it well maintained, if you have your window regularly inspected and monitored and note problems such as cracking, bowing, paint deterioration or excessive condensation and leaks and address these problems in time then your stain glass window could last centurys