Replacing windows in heritage and listed buildings

by Andrew Madge, Managing Director of Gowercroft Joinery.

Finding appropriate replacements for old and degraded single-glazed windows in heritage and listed properties can be a challenge, particularly when trying to combine building conservation requirements with the modern desire for a comfortable and energy-efficient living environment.

When the original wooden window frames are too rotten to be repaired, the traditional approach has been to specify like-for-like handmade single-glazed timber replacements, which usually means having to accept a relatively poor level of thermal and acoustic performance or opt for secondary glazing solutions to compensate.

In an ideal world, most of today's owners of old and period properties would like to benefit from modern performance standards, including durability, sustainability and a good level of energy efficiency, in order to create a pleasant living environment but without spoiling the original aesthetic.

Energy efficient double-glazing

Although superior energy efficiency can be achieved through standard factory fitted double-glazed units (typically with a 16 – 20mm Argon filled cavity), the giveaway 'double shadow' on the glazing and the thicker profiles required to accommodate heavy double-glazed units are almost invariably unacceptable for period properties.

This has led to the popularity of 'low sightline' slim double-glazing, which aims to combine some of the features of a slim window with better thermal performance. This is achieved by using a heavier inert gas such as Krypton or Xenon to reduce the thermal conductivity sufficiently to create an effective smaller cavity in between the panes. The sightline, (which is the area from edge of the glass to the top of the spacer bar), is typically reduced to just 5-6mm to allow thinner window sections.

However, this type of window is now the subject of some controversy, not least within the Glass and Glazing Federation (GGF), because in order to achieve such a slim slightline it is necessary to reduce the amount of sealant and desiccant used in the perimeter of the unit. This can cause instability and increase the likelihood of unit failure. In fact, there is an ongoing discussion as to whether some of these units even comply with the Construction Products Regulations (CPR) [1]

Main picture, Gowercroft - Winston sliding sash external in Listed property. Inset, Gowercroft window

As a result of these still unresolved matters, striking the right balance between performance and aesthetics has become even more complicated and challenging.

Vacuum glazing

An alternative option which is now beginning to attract interest in the heritage sector is 'vacuum glazing', where all the air is extracted to form a vacuum cavity between a pane of low emissivity (low-e) glass and a pane of clear float glass. With no air or gas between the panes, there is nothing to transfer heat, so the energy efficiency is much greater. The same applies to sound.

Originally developed in Japan over twenty years ago as a lightweight, energy efficient solution for buildings in earthquake zones, Pilkington Spacia™ is the first commercially available vacuum glazing in the UK, which offers U-values of 1.1 W/m2K on its standard units and 0.9W/m2K on its higher performance Spacia™ Cool units.

With a total thickness of 6.2mm, (the vacuum cavity being just 0.2mm), it is roughly a quarter of the thickness of a conventional double-glazed unit and half the thickness of a typical slimline double-glazed unit. It is also approximately two thirds of the weight, which makes it narrow and light enough to fit into most existing timber frames without giving any discernible double reflection.

However, the vacuum process can only be achieved by creating a hole in the inner pane, which is located 50 mm from the edge of the glass and covered by a permanent 12 mm black plastic cap. For some conservation officers, this can be a distraction, but for many others it is barely noticeable behind the curtain sweep. Similarly, the 0.25 mm micro-spacers, which sit at 20mm intervals to keep the two panes a fixed distance apart, are visible on close inspection, but not in day to day use.

The sustainability of a glazed unit imported from Japan could also potentially be challenged, until one considers that the embodied energy required in the production of inert gasses used in the manufacture of most conventional double glazing is far higher than the energy involved in global shipping. [2]

Despite its imperfections, vacuum glazing technology is now opening up opportunities for owners of heritage properties looking to replace the glazing on old windows, whilst preserving as much of the original joinery as possible. It is also being adopted by specialist joinery companies wanting to create traditional looking windows with modern performance benefits for those period homes where the original frames cannot be salvaged.

A modern period window

As modern methods of fabrication can so easily destroy the overall aesthetic that conservation officers are trying to preserve, it is vitally important that any thin glazing solution is combined with traditional joinery and hardware, and that any modern performance enhancing features are as un-intrusive as possible.

Below, Gowercroft - Winston sliding sash window in Listed property

Gowercroft Joinery is the first window manufacturer to have incorporated Pilkington Spacia™ into a traditionally crafted range of Heritage windows made with modern materials like Accoya® (a modern modified timber whose cellular structure has been treated to increase its durability, stability and longevity) sprayed with a unique formulation of protective paint, guaranteed to deliver zero maintenance for 10 years.

Whilst the range does not claim to use real putty to secure the glass panes like the windows of yesteryear - in a modern high-performance window this would be incongruous - the putty line is replicated in the outer profile. Although more regular looking than traditional putty, it does significantly improve security and coating longevity. Similarly, modern seals that are designed to keep the windows weather-resistant are neatly concealed within the joinery.

Arguably, any attempt to provide an acceptable modern solution for a listed property will involve some degree of compromise. The perfect window for 'modern living' in a heritage home may not yet have been designed to everyone's satisfaction, but conservation officers, specifiers and owners of listed properties do now have options, including some highly functional, future-proofed and genuinely sympathetic modern products.

Footnotes:

1 Link to GGF statement:
https://www.ggf.org.uk/low-sightline-insulated-glass-units/
"The Construction Products Regulation (CPR) became law in 2013 and requires all glass units to comply to the harmonised European standard EN-1279-5. By reducing the edge-seal sight line of the units to 5-6mm, manufacturers are increasing the difficulty of achieving all of the required testing for EN-1279-5 standard; as there is reduced space in a low sight line unit for sealant and desiccant around the perimeter of the unit. The increased breakdown rates of low sight-line double glazing were highlighted in a Guest Blog on The Double Glazing Blogger in 2017 and this caused a lot of discussion in the industry. There also evidence of a significant drop off in U-value over a 12-month timescale in the Changeworks Report; Double Glazing in Listed Buildings."

For more information of gas retention in slim line double glazed units:
www.changeworks.org.uk/sites/default/files/Double_Glazing_in_Listed_Building.pdf

Research report 2: Thermal performance Report commissioned by Changeworks on behalf of Historic Scotland, March 2010.

2 https://www.changeworks.org.uk/sites/default/files/Double_Glazing_in_Listed_Building.pdf

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For more information about Pilkington Spacia™ visit
www.pilkington.co.uk/spacia

Above, Gowercroft - Winston sliding sash windows in London brick bay

Above, Gowercroft Richmond casement windows in a conservation area