

Metal windows



ENGLISH HERITAGE

The origins of metal windows

Iron frames and iron supports were used to construct ecclesiastical stained-glass windows throughout the medieval era. By the sixteenth century the first metal-framed glass windows were beginning to appear in secular homes as well. The glazing of these windows often used the now familiar arrangement of diamond-shaped or square glass panes set in lead comes, which were themselves tied to two or three vertical iron bars.

By the middle of the eighteenth century improved casting techniques encouraged architects to experiment with metal sash windows, which had been used since the end of the previous century. In 1750 James Gibbs installed copper sash windows at Bank Hall in Warrington (now Warrington Town Hall); at about the same time John Carr was fitting iron sashes onto the side elevation of Flitcroft's Palladian-style Wentworth Woodhouse in Yorkshire. These copper or iron windows were often set in wooden frames, preferably oak, if this could be afforded. By the 1770s some enterprising firms were specialising not only in cast-iron bars and frames, but also in iron sills. In 1783 the Carron company cast iron sashes for Inveraray Castle, although the finished products were not very successful.

The widespread introduction of the all-metal window during the Regency period was largely the result of the use of iron windows in industrial or similarly utilitarian contexts. By 1790 cast-iron windows were being fitted in a number of new workers' housing developments; many of these, however, were casements, not sashes. The first fireproof mill, William Strutt's Derby cotton mill of 1792, naturally included iron (sash) windows, since timber was not used in its construction. By 1800 iron windows were regularly used for these more down-to-earth buildings, and in 1801, for example, the



The Hoover Building (1932), an Art Deco classic beside the A40, Perivale, was restored for its new owners and its windows on the main facade repaired on site

Coalbrookdale company was offering cast-iron casement windows in a wide variety of styles.

By this time metal windows were also being recommended to make workhouses and mental hospitals more secure. In 1796 The Retreat in York became the first lunatic asylum to be fitted with cast-iron windows. Metal windows not only helped to keep the inmates inside; they also reduced the risk of fire, a common hazard in asylums. By 1840 cast-iron windows were standard for this type of building. In 1848 a patent was granted for a cast-iron sash window 'which appears to possess advantages for lunatic asylums, workhouses and

schools', since 'when open the sash bars present a guard against patients escaping or children falling, yet offer no obstruction to free ventilation'.

By 1820 metal sashes were also being used in homes. In 1805, for example, iron sashes were supplied for the royal residence of Kew Palace.

Cast iron was particularly suited to more complex and exotic forms of glazing, such as gothic and octagonal. In 1818 J B Papworth noted of cast iron that 'as this metal is now so generally substituted for several other materials, the century may not improperly be called another iron age'. By 1833 Loudon's *Encyclopaedia of cottage, farm and villa architecture* was observing that 'Windows of cast-iron, very fit for cottages, are now made of different forms, and very cheap'.

Modern metal windows

It was with the casement rather than the sash that metal window construction entered the twentieth century. By 1850 industrial buildings often had cast-iron side- or top-hung casements, or fixed windows with only one or two hinged lights. However, by 1900 technological advances had led to the mass



FRAMING OPINIONS
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production of metal windows made not from cast iron, but from hot-rolled steel. Firms such as Crittall revolutionised the worldwide use of the metal casement. W F Crittall was responsible for the development of the Universal suite of hot-rolled steel sections that formed the basis of what we now regard as the classic metal windows of the 1920s and 30s. These steel windows were strong, slim, cheap, and fire-resistant, factors that made them highly competitive with traditional softwood sashes.

After the First World War the major metal-window manufacturers developed standard window sizes for domestic use. Residential windows were produced to standard, modular Imperial dimensions in a wide variety of elevational designs known as the F range. Widely used by the pioneering architects of the Modern Movement, these windows were in keeping with the new vogue for healthy, outdoor living that swept Europe in the 1930s. Since steel casements could open wider than traditional wooden sashes, they were preferred in buildings in which plenty of fresh air was suddenly a major priority.



Cast iron sash window of c1805 in Essex

The increase in the number of large commercial buildings during the interwar period led to the development of the Fenestra system of window walling: 'walls of daylight'. This system, using

interlocking horizontal and vertical glazing bars, was derived from a German patent used by Fenestra Fabrik of Dusseldorf which Crittall acquired in 1905. Crittall's subsidiary company in Germany subsequently supplied the windows for the famous Dessau Bauhaus, designed by Gropius in 1926; sadly, these windows have all been replaced.

Bronze windows and doors were not unusual by the 1930s, and in recent decades aluminium windows (generally lacking historic design) have become increasingly common. However, steel windows are still made in substantial quantities, and older, iron windows can be easily repaired or replicated.

Galvanising and powder coating

In 1945 it became the practice in the UK to galvanise steel windows after fabrication. The windows are dipped in a bath of molten zinc and the zinc forms a molecular bond with the steel. Galvanising protects against corrosion without the need for further painting.

Since the mid-1970s many firms have applied a tough polyester powder coating on top of the galvanising to give a decorative finish. This coloured coating is applied in the factory by electrostatic spraying followed by stoving in an oven. The initial coat lasts much longer than site-applied coats of paint, and manufacturers claim that its maintenance-free surface looks just like paint.

The repair of metal windows

Traditional metal windows can often be economically repaired and made energy-efficient, avoiding the need for total replacement. Many firms undertake this type of work. Renovation can be done either on site, using tools such as wire brushes, files, and small grinders to remove rust and scales, or in the factory, where the windows can be grit- or shot-blasted and galvanised (or, in the case of more fragile specimens, zinc-sprayed). Remember that what looks thoroughly rusted and unusable may have decades of life left in it. Rust occupies seven times the volume of unoxidised iron, and thus may



A typical steel window of the inter-war period

appear to be a far more serious problem than it really is. If in doubt, call in a recognised expert, particularly if the windows need straightening or the glazing is damaged.

Draughtproofing can easily be fitted to existing or new metal windows. Thus, traditional metal windows can be made draught-free and energy-efficient at comparatively little cost, without recourse to replacement double-glazed units. Secondary glazing can also be added to help keep out noise. For further information see Framing Opinions Leaflet 1, *Draughtproofing and secondary glazing*.

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