

Shopfront Design and Construction: The Use of Iron and other Metals

Ali Davey

Technical Conservation Group, Historic Scotland

Introduction

My talk will concentrate on ferrous metals and ironwork and I will touch on bronze and chrome. I will give a brief overview of the historical development of the iron industry in Scotland and then look at some of the technical issues when conserving cast iron shopfronts.

Development of Iron Industry in Scotland

Scotland was very important in the 19th century in terms of the iron industry. At this time it was exporting architectural ironwork worldwide including entire structures to South America, Thailand and South Africa. The success of the industry was down to two discoveries:

1. David Mushet discovered a native ironstone, Blackband ironstone in 1801
2. James Beaumont Neilson discovered the Hotblast in 1828.

Blackband ironstone needed higher temperatures to smelt it and extract the iron and this problem was overcome in 1828 when the hot blast was discovered. Until then foundries had pumped in cold air, but Beaumont Neilson discovered that blowing hot air dramatically increased the temperature. From this point onwards it was economically viable to use a local source of ironstone and hundreds of foundries cropped up across Scotland mostly in the central belt. There were several important Scottish companies:

- **Walter Macfarlane (1850-1967)**: set up in 1850 by Walter Macfarlane with 2 other partners and became one of the largest and most successful foundries. The skill which went into casting some of the items was breathtaking. At the 1876 Glasgow Exhibition Walter Macfarlane had a stand, the size and scale of this indicates popularity of the material-the wonder material of the age.
It was traditional to have company name and foundry name and MacFarlane's was the Saracen foundry at Possilpark, Glasgow. It was an enormous foundry with a railway siding into it and showrooms at the front. The company moved into large scale constructions such as bandstands, drinking fountains and glass houses. Other buildings included market buildings and pavilions.
- **George Smith & Co (1858-c1899)** The Sun Foundry produced a wide range of decorative ornamental ironwork as well as structural elements. They created the amazing Paisley fountain which has life sized walruses and cast iron rocks.
- **McDowell & Steven & Co (1834-1964)** was another major Scottish competitor.

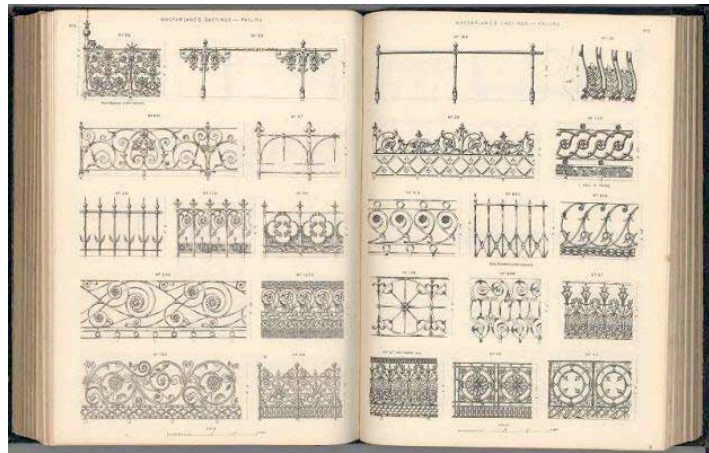


Macfarlane's 1876 Glasgow Exhibition stand

Many of the large foundries cast their name into the items so it is easy to identify them and they also produced foundry catalogues to promote their products.



Casting with name of
George Smith & Co



Foundry catalogue

Popularity of iron

Iron has been used for millennia but it was not until improvements in technology that it could be used in a far more widespread way. Until the late 18th century it was used for small items but from that period iron came to be applied to buildings on a larger scale.

Its main properties are:

- Strong, durable and versatile
- Mass production possible so was affordable
- Versatility meant it could mimic other materials with a broad range of designs
- Bespoke designs possible
- Mass produced ornate castings possible even for functional buildings such as public toilets
- High quality patterns and casting

Effects on building design

There was growth in the industry from 1860 onwards which reached a peak in Scotland around 1890. The growth had the following impacts on building design:

- Increased floor spans- iron joists could span farther than timber
- More open floor plans with fewer supporting walls required
- More and larger window openings which, combined with the development of plate glass, allowed a much larger ratio of glass in the building
- Lighter, brighter interiors possible
- Ornate facades and exteriors

Effects on Shopfront Design

Specifically on shopfront design, the impacts were numerous:

- Larger windows coupled with development of cheaper plate glass
- Changed the way in which goods could be displayed
- Development of 2 storey shopfronts
- Stock of parts chosen from catalogues
- Structural as well as decorative elements

Examples of its use in shopfront design:

2 High Street, Cromarty where the cast iron shopfront is a later addition to the building and is effectively a status symbol. It is by Walter Macfarlane and you can identify in the catalogue which items they have chosen.



High Street, Cromarty

In High Street, Jedburgh architects drawings show the structural use of iron- the pierced cast iron columns to the front and to the rear is a cast iron column for carrying the roof.



Corner of High St, Jedburgh

Decorative cast iron columns were adapted to suit the façade of each building. Some designs are seen across Scotland, with similar columns appearing in Lerwick and the Borders, for example. It was also used for verandas and canopies.



Decorative elements

Cast iron has both a decorative and a practical application such as a former butchers with cast iron grilles in the door and stallriser for ventilation which are functional and highly decorative.



Stallriser using decorative fretwork

St Andrews has the highest concentration of surviving cast iron shopfronts in Scotland. There is a huge variety of column types found in the town, some very ornate.



St Andrews

Two storey shopfronts were also possible using cast iron such as The Popular Supply Stores which is in Ayr. It has a full cast iron façade produced by the Lion Foundry.



The Popular Supply Stores, Ayr (Lion Foundry)

Decoration was used for both structural and other elements such as cresting on cornices.



Cresting on a shopfront

Warehouses and Arcades

The development of large iron structures like warehouses was spear-headed in Glasgow. Gardner's warehouse in Jamaica Street was designed in 1855-56 by John Baird. The columns decrease with the height of the building adding to the lightness of the structure. The nearby Ca'doro building was designed by John Honeyman in 1872 although it suffered a fire in 1988 but has since been renovated.

Selfridge's department store in London was made by Walter MacFarlane's with cast iron breast panels and curved glass entrance. Cast iron was also used for shopping arcades such as in Leeds and Johannesburg.



Ca'doro Building, Glasgow



Gardner's Warehouse, Jamaica St, Glasgow

Other Metals

Bronze was normally applied to high status shopfronts particularly for windows and trims and vents. It is used widely in various shopfronts such as Burtons in the 1930's and Walkers shop in Aberlour, c1960.

Chrome was used mostly for 1930's shopfronts to emphasise the idea of streamlining.



Bronze shopfront, Aberlour

Cast Iron: Technical Issues

Cast iron has a crystalline structure and can only be shaped by casting. It is bad in tension but good in compression and it is brittle so can shatter with a sharp blow from a hammer. It is cheaper to produce en masse than wrought iron.

Wrought iron is fibrous and contains slag. It is good in tension but cannot be cast so is shaped by hammering. Wrought iron is expensive to produce en masse so tends to be used for smaller items.

In the context of shopfronts, most problems with cast iron usually relate to surface corrosion or sometimes there may be surface staining. With cresting and finials, where wrought iron fixings were used the combination of this with cast iron causes galvanic corrosion to occur, the fixings to corrode this causes the cast iron falls out of place. If an element is lost it may be possible to go back to the original catalogues and find the illustrations and which foundry made them.

It may be worth undertaking paint analysis depending on the importance of the shopfront. Original coatings often survive under later applications of paint and can reveal earlier decorative schemes.



Paint analysis

With cleaning, the main aim is not to damage the cast iron. Be cautious of using chemical cleaners as cast iron is slightly porous so the chemical may soak in to the metal and cause problems later on. Blast cleaning is commonly used with different options from mineral grit to plastic beads but we normally recommend an inert mineral grit. Any cleaning needs to be done carefully as, for example, heavy handed use of a needle gun can cause damage. All cleaning needs to be done by an expert who is experienced in these methods.

Replication is an important issue when it comes to casting. The basis for the casting is the pattern so it is important to get this right and to inspect the pattern before a casting is made or the loss of detail may mean the casting has to be condemned. To get crisp castings the pattern must be right from the outset as this will directly affect the casting. It is also important to pay attention to other details like cleaning off flashings. You should demand high quality to promote best practice among foundries.



Using a needle gun

Moulding techniques

Green sand moulds give a traditional surface finish and a higher definition for decorative detailing. Modern mould techniques use silica sand which is set using chemicals. Modern techniques are good for gutters etc, but for architectural decorative detailing the traditional method is superior.



Traditional green sand mould



Cast and mould

Paint will protect the ironwork. Current best practice recommends a zinc based primer, a micaceous iron oxide coat and then two coats of gloss finish:

Zinc Phosphate 1	60 microns
Zinc Phosphate 2	60 microns
Micaceous Iron Oxide	55 microns
Gloss finish 1	35 microns
Gloss finish 2	25 microns
Total DFT	230 microns

Clearly, the type of fixings used are really important for ironwork. You should not use galvanised steel but instead use stainless steel or bronze. Nylon washers should also be used to isolate fixings.

Bronze

Bronze was traditionally patinated using chemicals so when conserving this material you need to consider how important the original patina is and whether it should be preserved. This will influence the cleaning methods adopted from cleaning lightly and re-waxing to more aggressive cleaning using a form of blast cleaning techniques and then re-waxing and patinating.

Chrome

There are many proprietary brands of chrome cleaner but if it has deteriorated significantly the only option is to re-plate it. This will involve its removal and taking it off-site to be re-plated.



Chrome used on a 1930's shopfront