

Forges and Foundries



Until the eighteenth century the working of iron had been restricted by the large quantities of charcoal required for smelting, with the result that ironworks were usually sited inaccessibly in the middle of forests. In 1709 Abraham Darby, an ironmaster with a furnace at Coalbrookdale on the River Severn, discovered that coke could be used instead of charcoal for the smelting of pig-iron (used for cast-iron products). The Severn region became Britain's centre of iron production in the early stages of the Industrial Revolution.

Forges

From very early times iron was produced by specialist smelters, but was actually turned into useful items in forges by blacksmiths. All that was needed was a small raised hearth, bellows, water to cool the metal down after hammering, and an anvil. The bellows increased the air supply to the fire, raising the heat level sufficiently to make the wrought iron red hot and easily hammered into shape on an anvil. However, especially from the eighteenth century onward, some items were too big and heavy to be handled this way, and needed water-powered hammers.

Foundries

Although in the fifteenth and sixteenth centuries iron was cast straight from a blast furnace, it soon became evident that the quality was better if instead it was run into bars, called pigs, and later re-melted for casting. After the development of the cupola furnace in the 1790s, the way was open for casting to take place anywhere in the country, using either pig iron brought in from the smelting districts or scrap iron. The cupola furnace used coke as fuel, and limestone was used as a flux to help carry away impurities. The result was the establishment of large numbers of small foundries serving local needs. The foundries supplied cast items for domestic use, for builders, for local authorities and so on. Many were also engineering works, producing farm and mill machinery, small steam engines, pumps, malting equipment and much more. Cupolas are still used, with modifications to reduce pollution, and most countries still have some working.



ACTIVITY 1

Make an 'iron' casting!



To produce an iron casting a pattern and a mould are necessary. Here is the process for making an iron casting, which we've then adapted to make one 'iron' out of plaster of Paris!

- The pattern, usually in wood, is the shape of the item being made, though slightly larger as iron shrinks as it cools. The mould consists of an iron box filled with damp sand which is compressed around the pattern.
- The pattern is removed leaving an impression in the sand
- Molten iron is poured into the impression
- Once the iron has hardened, it is broken out from the sand, and the whole process can be repeated. Hundreds of identical items can be made by re-using that pattern, however elaborately decorated.

Although today large foundries use machinery to produce moulds, green (damp) sand moulding is still used in small foundries, especially for short run or one-off items such as house or street names.

- To make your pattern, you can use plasticine – you won't need to put it inside an iron box filled with sand! Roll out your plasticine so that it is a deep enough to fit whatever you are going to use as your pattern (e.g. shells, hairslides).
- Remove whatever you have used as a pattern from the plasticine – it should have left an impression.
- You can then pour plaster of Paris (perhaps coloured to look like iron) into the plasticine impression.
- Once the plaster of Paris has hardened, you can take the plasticine away from it to reveal your 'iron' casting.



ACTIVITY 2

We're going on an iron hunt!



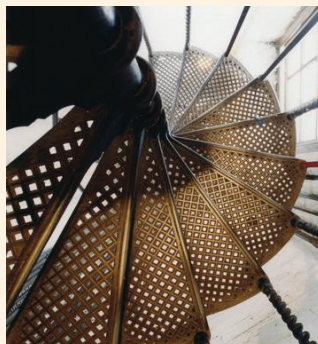
Explore your local area for items made of iron. Much street furniture is made of cast iron. Anything with decoration or lettering forming an integral part of it will almost certainly be cast iron. Decorative wrought iron always consists of thin strips bent, shaped and clasped or welded together at contact points.

- Use a magnet to test for iron content (although this cannot distinguish between cast iron, wrought iron and steel).
- Look for cast iron and wrought iron items.
- Lettering on cast items can be rubbed or traced.
- Frequently, tucked away at the bottom, back or side there will be a name, which may be either of the founder or of the person or firm for whom it was cast.
- The town of origin may well be given and you can look in trade directories to trace the firm's history.
- Back in class use air-drying clay to make 'cast-iron' street signs. Paint them with metallic paints for a iron-like effect.



ACTIVITY 3

Match the object



These are some of the cast iron objects you would have found in a Victorian home.

- Can you match the objects from the past with the objects we use now?
- What materials are the modern items made from?
- Do you think these materials make the object better/easier to use?

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