

Steel

Is Steel a New Material?

Iron – from which steel is being manufactured – has been made in Europe since 1,700 BC. Since the very beginning, small quantities of steel have always been produced; steel is actually carbon-enriched iron. In the 15th century, an unforeseen but essential event allowed for the discovery of cast-iron, i.e. a liquid ferrous metal ideal to manufacture a whole range of items. However, it is only in the 19th century that the making of steel truly boomed.

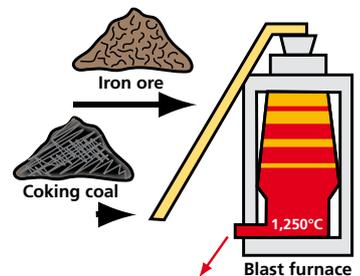
There are two kinds of steel:

- **Non alloy steels**, which are made of iron and carbon and often coated with another metal (e.g. a small steel sheet covered by a thin layer of tin gives a material called tinplate which is the material of cans, caps, aerosols, beverage cans), and
- **Alloy steels**, for which other chemical compounds than carbon are added to iron. The dosage of the different materials varies for each compound (e.g. an alloy containing 17% chromium and 8% nickel is stainless steel).

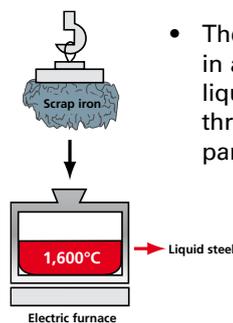
How is Steel Manufactured?

There are two ways of producing steel:

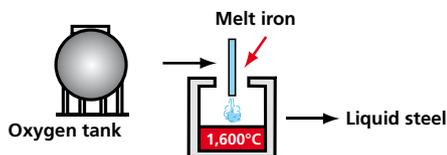
- The **cast iron process**: pre-treated iron ore, coke (almost pure carbon) and – if needed – recovered scrap iron (30% maximum) are introduced in a blast furnace. The hot air – 1,200°C – blown into the base of the furnace induces the combustion of the coke. The carbon oxide hence created will “reduce” the iron oxides, i.e. take out the oxygen they contain and isolate the iron. This leads to the production of liquid iron called “cast iron”.



- The **electric process**: recovered scrap iron is introduced in an electric furnace where it is melted at 1,600°C. The liquid steel obtained through this process then goes through the same steps as in the cast iron process. This particular process uses 100% recycled iron.



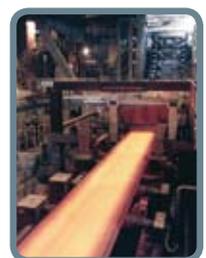
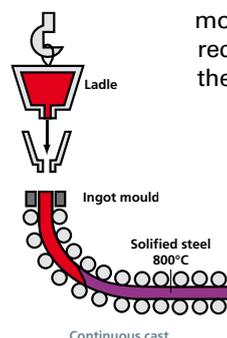
At refining, oxygen is injected into the furnace to activate decarburization and heat the metal up.



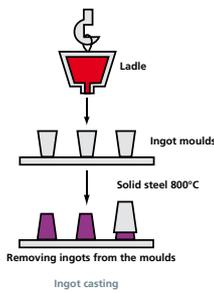
Source: Photothèque Cockerill Sambre

Then, there are two different processes in order to harden liquid steel:

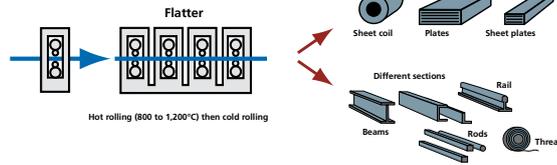
- **Continuous casting**: steel is cast in a square, rectangular or round ingot mould. At the end of the process, the result is a solid, square-, rectangular- or round-section rod, which is then cut in sections of the desired lengths.
- **Ingot casting**: steel is cast and hardened in moulds. After hardening, the ingots are removed from the mould. In both cases, at this stage, the products obtained are called **semi-finite products**.



Source: Photothèque Cockerill Sambre



The semi-finite products are reheated in furnaces at 1,200°C to be laminated i.e. rolled-stretched and rolled-flattened. After laminating, there are two ranges of products: long products – beams, rods, threads, etc. - and flat products – plates, sheets or coils.



Source: Cockerill Sambre photographic library

Flatter

What is Steel Used for?

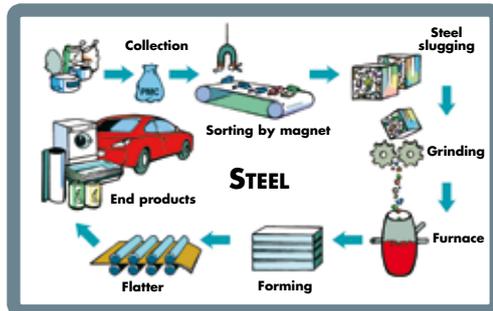
Steel is strong and can stand heat and cold. It can take all possible shapes and is cost-effective. Additionally, if it is collected with other packaging wastes, it can be easily sorted because it is magnetic, which means that a simple magnet can separate it from other types of waste. Finally, it recycles easily and indefinitely.

Why is Steel Recycled?

The Gauls and the Romans already recycled their damaged weapons or tools by melting them again! Every ton of recycled steel can help save 1.4 ton of iron ore. Conversely, a steel can landfilled will take 100 years to vanish. Steel is the most recycled material on earth! In Luxembourg, 2,292 tons of steel packaging have been collected in 2006.

How is Steel Recycled?

As steel contains iron – as opposed to aluminium – it is magnetic, it can therefore be sorted from other waste using a simple magnet. The recovered scrap iron is – as we have seen – then used in the blast furnace mix in the cast iron process or as sole feed in the electric furnaces used in the electric process.



Source: FOST Plus



Beverage cans are captured by the magnet

What can be Manufactured with Recycled Steel?

Steel is present in many different areas:

- A car is made of 65% recyclable and recycled steel – engine parts, body, doors, etc.
- Electrical appliances:
 - Washing machine: 57% steel
 - Cooker: 80% steel
 - Fridge: 51% steel
 } This steel is recyclable.
- Food packaging: cans and beverage cans mainly. This steel is recyclable and recycled.
- Building products: 70% of all building products made of steel – concrete rebars, metallic frames, etc. – are recycled.
- Tools, nails.



= 19,000 cans



= 215 cans



= 1 can