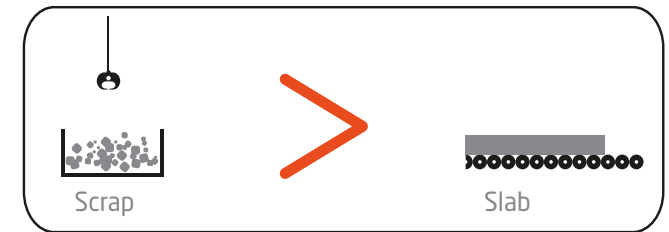


# Manufacturing process

## Stage 1 - the melt shop

Recognised as a reference for **sustainable development**, the production of steel starts with the **melting of scrap**. At the **melt shop**, the chemical composition of the stainless steel grade is determined. With a capacity of **2 million tonnes**, Stainless Europe's plants have a competitive advantage.



Using an electric arc furnace with a **melting capacity of up to 160 tonnes**, the **raw material** (recycled stainless and ferro alloys) is transformed into **molten metal**.

The molten metal is then transferred to the **converter**.

To obtain the correct chemical composition, alloying elements are added in the converter. **We can produce all of the standard grades.**

The ladle metallurgy process involves adding some alloying elements to obtain **the exact chemical composition** and the correct temperature before the continuous casting process.

The liquid steel is then cooled and solidified during the **continuous casting process**.

At this stage the maximum width is determined. Using an oxygen flame, the solid steel is cut into **slabs of up to 30 tonnes in weight, up to 12 m long, 200 mm thick and up to 2 m wide.**

Some slabs are then ground to remove surface defects before everything is shipped to the hot rolling mill.

### Information

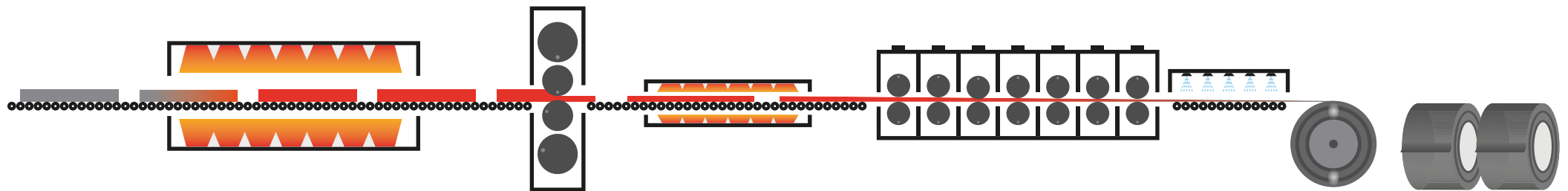
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# Manufacturing process

## Stage 2 - hot rolling mill

Aperam Stainless Europe's **hot rolling mill** has a rolling capability up to **2 metres wide**. This is the first step in reducing the slab's thickness from **200 to 3 mm**, in the form of a "**black coil**".



This process takes place at **Aperam Châtelet** and involves reheating the slab in a furnace at an average temperature of 1250 °C.

An initial reduction in thickness, from **200 to 40 mm**, is achieved through several passes on the roughing mill.

The thermal tunnel maintains the temperature of the slab even as its thickness is reduced.

Then the slab passes through a series of 7 rolling stands to reach approximately **3 mm in thickness** (1.2 min / max 13 mm). The metal is cooled down and wound to form coils, also called "**black coils**" due to their oxidized surface.

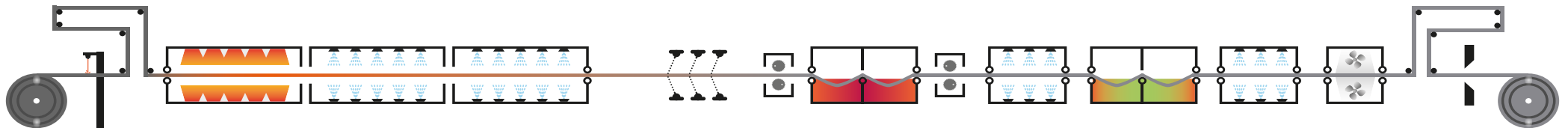
The coils are then shipped to the annealing and pickling plant. **We also sell black coils.**

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This stage recovers the **mechanical properties** of our stainless steels. It also produces coils with an **HRAP finish**, and a **minimum thickness of 1.2 mm and maximum 13 mm**. These coils are sold for applications with minimal aesthetic requirement, such as industrial applications.



At this point, the white HRAP coils can be sold without cold rolling or further surface finishing.

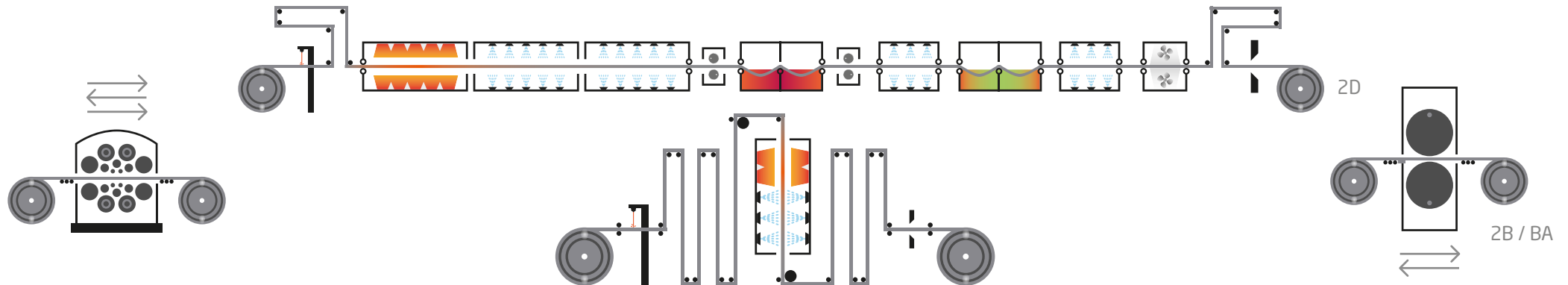
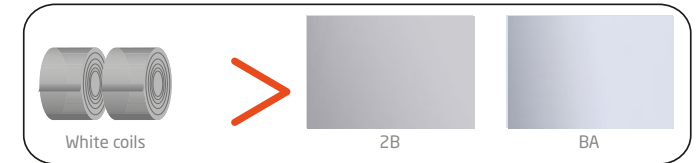
June 2018 - Aperam Stainless Europe. While every care has been taken to ensure that the information contained in this publication is as accurate as possible, Aperam Stainless Europe cannot guarantee that it is complete nor that it is free from error.

# Manufacturing process

## Stage 4 - cold rolling and final annealing

This stage reduces the thickness of the strip down to a minimum of **0.3 mm**. A **final annealing** ensures that the properties meet the customer's exact requirements.

The cold rolling process gives our stainless steels the required **flatness**, and a **surface finish** makes them suitable for such visible applications as household appliances.



The thickness of white coils – around 3 mm – is further reduced during the **cold rolling mill process**.

By rolling the strip several times in the reversible cold rolling mill, we can achieve a minimum thickness of **0.3 mm**, thus meeting the customer's requirements and the necessary **surface quality** for final use.

After cold rolling, the **annealing operation** recovers the mechanical properties of our stainless steels.

A **final pickling** then removes the annealing oxide and gives the stainless steel a **matt aspect** (2D).

Another option is to anneal under a protective atmosphere, thus retaining the cold rolled appearance for applications requiring **bright annealed finishes (BA)**.

The annealing process recovers the **ductility and formability** required by customers for processing.

In this case, no oxide is created and no pickling is necessary. **The strip is very bright.**

The **skinpass operation** guarantees the **flatness** and the **coil surface**.

One, two or three passes may be necessary.

By selecting different skinpass rolls, a surface finish suitable for visible applications, such as **household appliances**, can be produced (2B or BA).

### Information

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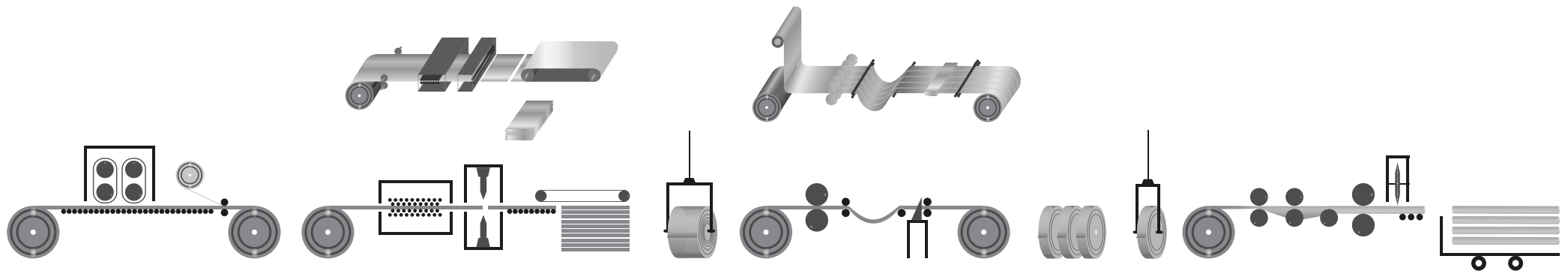
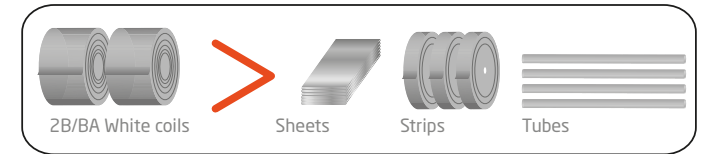
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# Manufacturing process

## Stage 5 - metal finishing

The final product is **slit to width** and **cut to length**. Some specific **surface finishes** can also be made. These metal finishing operations are carried out in our production sites and through our network of service centres.

Our materials are **100% recyclable** at the end of their life.



During finishing, the material is given its **final surface finish** appearance, as required by the customer's order. There are different operations, including **polishing, brushing or other special processes**.

The last operation is where the **final form of the material** is achieved. Coils can be **cut to length** to obtain **sheets**, blanks or discs.

Coils can also be **slit to width** in strip, **narrow strip** and blanks.

Using other processes, we can also produce a range of other finished products, such as **tubes**, which are made by **forming** and then **welding** the flat products.

### Information

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