

From iron ore to steel plate



Stronger steel – Stronger customers



Welcome to SSAB in Oxelösund



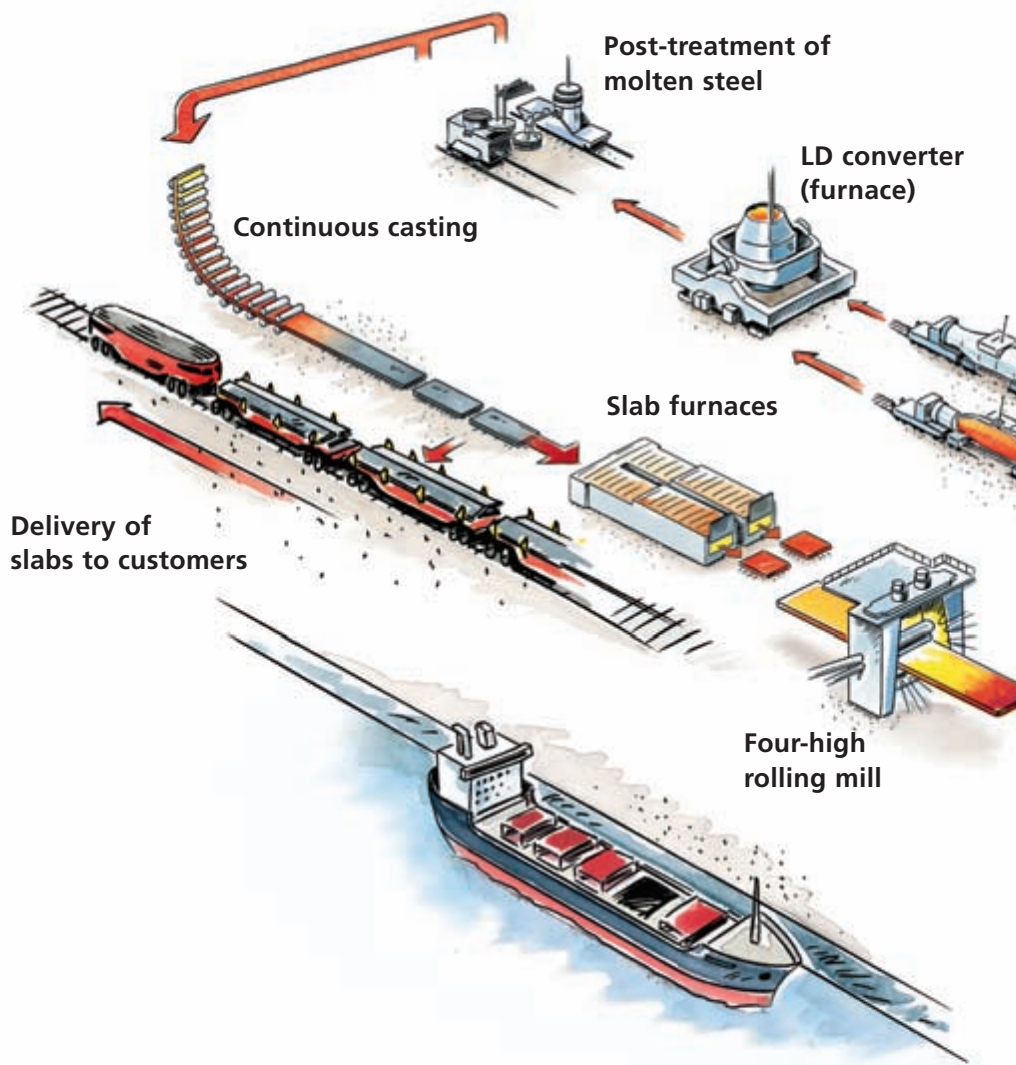
SSAB in Oxelösund is the world's largest supplier of quenched and tempered structural steel plate and wear plate. Our products - HARDOX® wear plate, WELDOX® structural steel plate, TOOLOX® prehardened tool and machine steel and ARMOX® protection plate - are sold through our own sales organization throughout the world, and 90 % of our products are exported. We are a high-tech steel company with unique expertise in materials technology. This has given us a position of world leadership in the field of quenched and tempered steels.

Due to our global presence, we can provide local customer service anywhere. Regardless of the country in which a customer is located, our advanced

logistics and local warehouses enable our products to reach the customer within 48 hours after receipt of order. Due to close cooperation with our customers, the performance of their end products can be steadily improved, which is more cost-effective for our customers and beneficial for our environment.

SSAB in Oxelösund is Sweden's only integrated steelworks – from iron ore to finished steel products. We are continually developing our products and processes so that we can supply our customers with stronger steels in shorter delivery times. To us, this is more than just steel – it is a high-tech adventure.

Production flowchart

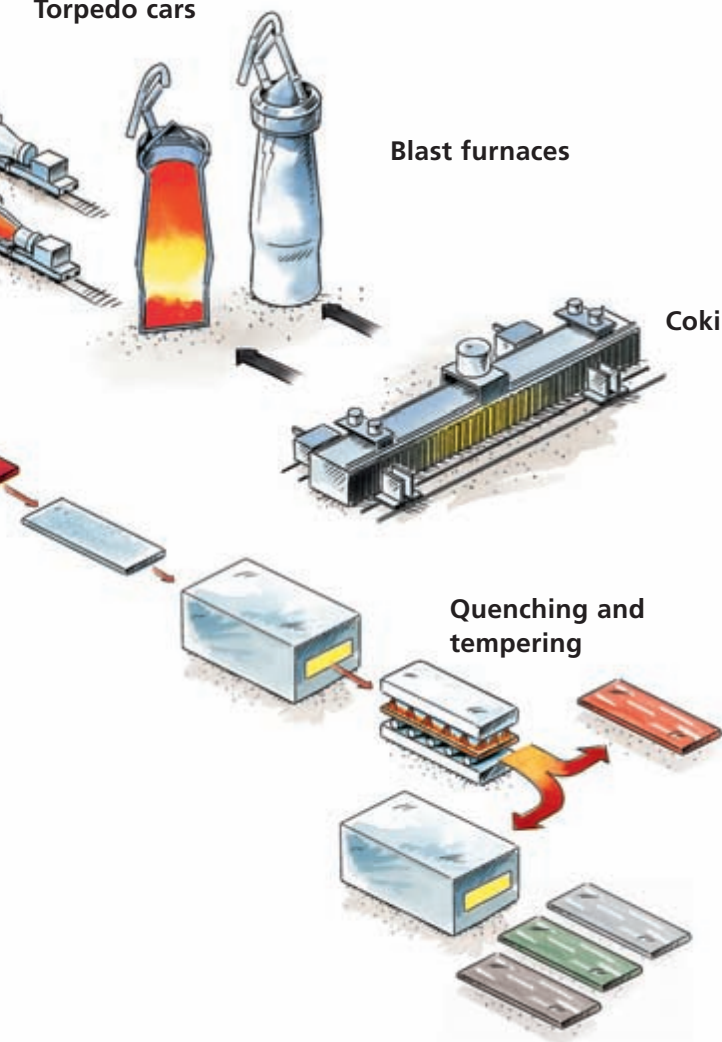


Torpedo cars

Blast furnaces

Coking plant

Quenching and tempering





Coal is converted into coke in the coking plant.



Coke is a fuel for the blast furnaces.



SSAB in Oxelösund has two blast furnaces that supply pig iron to the steelworks.

Coking plant

The coking plant consists of 100 ovens to which coal is supplied.

The ovens can accommodate around 14 tonnes of coal, and they are heated to 1000 °C. After approximately 20 hours of dry distillation, the coal becomes coke. The coke is then pushed out onto a trolley and cooled with water in the quenching tower.

Blast furnaces

Pellets made of iron ore are mixed together with coke and are charged into the top of the blast furnace. The coke serves principally as a fuel and reduction agent, but also enables the gases to flow through the material in the furnace, which would otherwise be very densely packed.

The pig iron at a temperature of around 1500 °C is tapped from the lower part of the blast furnace.

Torpedo cars

Eight torpedo cars that run on rails are used for transporting and storing the pig iron between the blast furnaces and the steelworks. The torpedo car capacity is 325 tonnes of molten pig iron, and its gross weight is around 650 tonnes.

LD converter (furnace)

In the LD converter, around 200 tonnes of molten pig iron from the blast furnaces are mixed with about 45 tonnes of scrap steel. The scrap cools the molten iron to the right temperature, while also serving as a valuable ferrous raw material. By blowing oxygen at high pressure onto the molten iron surface, the carbon content of the iron is reduced and impurities are removed. The molten iron becomes steel when its carbon content has dropped to below 2 %. Various alloying element additives are mixed into the melt to achieve the required composition of the steel.

At the end of the process, the steel melt temperature is around 1700 °C, and the melt is then tapped into large ladles and is transferred to the post-treatment plant.



The steel is cast into slabs for heavy plate and sheet steel.

Post-treatment of the steel

We have two post-treatment stations in the steelworks - the injection plant and the ladle furnace.

In the post-treatment process, the steel is analyzed, its temperature is finely adjusted, and remaining impurities are removed. Further alloying elements are added at this point to enable different types of steel to be produced to meet the customer's requirements. We can also vacuum-treat the steel.

Continuous casting

After post-treatment, the molten steel is cast into solid slabs. This is done in two continuous casting machines. The solidified steel is cut into pieces – known as slabs – which are around 11 metres long.

The pig iron is converted into steel in the LD converter.



The slabs are heated to around 1200 °C in the slab furnace.



Modern technology is used for controlling all production processes.



The slabs are rolled into plate in the four-high rolling mill.

Slab shears/slab furnaces

The slabs from the continuous casting machine are first cut into shorter lengths as specified in the order. The slabs are heated to around 1200 °C in the slab furnaces and are then rolled in the four-high rolling mill into raw plate.

Four-high rolling mill

The four-high rolling mill consists of four large rolls arranged vertically above one another. The plate can be given various properties by controlling the roll force and the plate temperature.

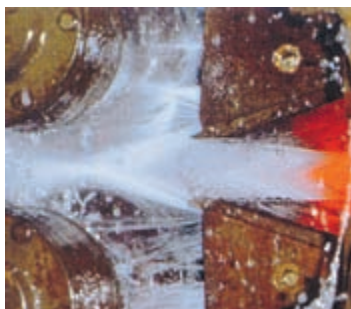
SSAB Oxelösund has one of the world's most powerful four-high rolling mills, capable of rolling raw plate from 150 mm thick down to 4 mm.



Plates up to around 40 metres in length are rolled in our four-high rolling mill.



Plates are cut to shorter lengths in flying shears.



The Unique properties of the plate are achieved in our roller-quenching line.



The plates are marked and then coated with protective paint.

Formatting

After rolling and direct quenching, if required, the plates are formatted. This means that the plates are cut to the specified sizes. Formatting can be done mechanically in large shears, or by gas or plasma cutting.

Quenching and tempering

Quenching and tempering are heat treatment processes. Quenching is carried out by heating the plate to around 900 °C and then quenching it to room temperature with large quantities of water. The plate acquires properties that makes it extra

hard and strong. After quenching, plates may be heated again, which is a process known as tempering. Tempering results in high strength and toughness of the plate.

Painting and marking

The plate is cut to the required length and is then shot-blasted to produce a clean surface. The plate is then marked and coated with anti-corrosion paint.



HARDOX plate ready for delivery to the customer.



Products

HARDOX

HARDOX wear plate is the obvious choice for products that are subjected to extreme wear. The high abrasion resistance and hardness of the plate increases the wear life of products such as dumper bodies, excavator buckets and crushers

The hardness of the plate is achieved by quenching in our quenching plant. This method enables high hardness to be achieved without the plate becoming brittle.

The result is a wear plate that is easy to machine, bend and weld.

The unique properties of HARDOX give the end product longer wear life and make it possible to design simpler and lighter products. The end customer's maintenance costs are reduced and the overall economy is improved.

WELDOX

WELDOX is an extra-high strength structural steel that makes it possible to produce strong yet lightweight structures.

This can be put to use for new design solutions and for achieving material savings, which assures the end customer of improved profitability and competitiveness.

WELDOX is an excellent choice for products such as mobile cranes, truck-mounted cranes and trailers.

The plate has been developed to provide good weldability, and has extremely high strength and toughness. Due to its purity, the steel plate has excellent bending properties.



ARMOX

ARMOX protection plate is used for a variety of applications in which there are risks of projectile or explosive attack. Common applications include vehicles for the transport of valuables, limousines, mine clearance equipment, banks, airports and UN assignments.

Higher contents of alloying elements such as chromium and nickel are needed to provide the plate with the required properties, and the steel must have very low contents of inclusions and dissolved gases (oxygen, hydrogen and nitrogen).



TOOLOX

TOOLOX is a prehardened tool and machine steel ready for use on delivery.

The term tool in this context refers to tools such as moulds for plastics, edging presses, etc., and not products such as wrenches and screwdrivers.

The customer need not process the plate further and can use it directly in production. TOOLOX is unique in this respect.

A high tempering temperature makes the steel dimensionally stable, and it can therefore be machined without sustaining undesirable dimensional changes.

SSAB in Oxelösund gives added value to the customer



We cooperate with our customers to develop new products, which gives definite added value to our customers. This added value can be achieved, for example, by extending the wear life of the customer's product or by reducing its weight, thus enabling it to lift more or carry more payload.

A good example in which our material played a decisive development role is in a new dumper body concept that a customer developed with the assistance of SSAB in Oxelösund. The new dumper body is designed for mounting on a truck and is specially engineered to withstand very hard and demanding loading conditions. Dumper bodies are generally used for transporting abrasive bulk materials

such as rock. The customer knew about the advantages of our quenched and tempered steels and therefore turned to us for assistance. The company wanted to offer its customers an entirely new type of dumper body, and knew that part of the solution lay in using a different material for the body structure. The aim of the new dumper body is to reduce the deadweight and thereby increase the payload capacity, but without increasing the gross vehicle weight. Moreover, the abrasion resistance increases the useful life of the body.

This marked the beginning of profitable cooperation for both parties. The cooperation led to a new, efficient half-pipe dumper body made of HARDOX 450 in thicknesses between 4 mm and 7 mm.

HARDOX®
SLITPLÅT

WELDOX®
KONSTRUKTIONSSÅL

ARMOX®
SKYDDSPÅL

TOOLOX®
PREHARDENED TOOL & MACHINE STEEL

Our environmental work

The aim of SSAB in Oxelösund is to be among the world's foremost steelworks in environmental performance. We have been granted environmental certification to ISO 14001.

Environmental targets

Setting environmental targets is included in our environmental management system. For a number of years, we have formulated our own targets over and above the demands made by the environmental authorities. As an example, our environmental targets include increasing our materials recovery and becoming more efficient in our use of natural resources such as raw materials and energy.

Recovery and recycling

In manufacturing our products, we work towards the best possible conservation of raw materials such as iron ore and coal. We recover by-products and scrap when we produce steel. Surplus gases are used for supplying heat for district heating and for power generation. This benefits both nature and us. Good economy and good environmental work go hand in hand. Read more about our environmental work at www.ssabox.com.



SSAB Merox



SSAB Merox is a subsidiary of SSAB in Oxelösund, and most of its operations are situated in Oxelösund. The company also pursues some operations in Borlänge and Grängesberg. Merox has been granted certification to ISO 14001:1996 and ISO 9001:2000.

The main task of Merox is to deal with solid by-products from SSAB. SSAB in Oxelösund manufactures annually about 1 700 000 tonnes of steel products, and this production rate yields around 700 000 tonnes of by-products. In addition to gases that are rich in energy, steel production also generates a number of by-products such as slag, scrap, mill-scale, tar, raw benzene and ammonium sulphate. Merox works towards finding the best solutions for recycling these raw materials. The work is included as part of the SSAB strategy for a better environment. This provides both environmental benefits and economic gains.

Recirculation

Around half of the by-products are recycled to the steel production system at SSAB. Recovery includes, for example, iron, steel and energy by briquetting. By-products that cannot be recycled to

the processes or that have a market value are sold on the open market. The specific properties of these products often offer better technical and environmental performance than traditional materials when viewed from a product life cycle perspective. It may now be difficult to find applications for certain by-products and they must therefore be used for landfill. About 50 000 - 70 000 tonnes of material now go to landfill every year, but the landfill sites are designed for possible future recovery.

Merox processes and recovers annually around 700 000 tonnes of by-products. For further information, visit www.merox.se.

Examples of applications

- Roadbuilding
- Soil stabilization, riding tracks
- Cement
- Agriculture
- Metals recovery
- Mineral wool
- Electronics
- Pharmaceuticals
- Matches
- Roof tiles

SSAB Oxelösund – a division of SSAB Swedish Steel Group – is the world's leading manufacturer of quenched and tempered heavy plate, marketed under the well known brand names of HARDOX® Wear Plate, WELDOX® Structural Steel Plate, ARMOX® Protection Plate and TOOLOX® Prehardened Tool & Machine Steel. The steels are characterised by the combination of high strength and toughness, derived from the clean steel composition and a unique production process.

SSAB Oxelösund focuses exclusively on developing quenched and tempered steels. With a strong local presence in more than 45 countries we provide our customers with high quality steel as well as commercial and technical support.

For more information, contact us or visit www.ssabox.com.

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