PORTFOLIO

REFRACTORY BRICKS: Whether based on aluminium silicate, magnesium oxide or silicon carbide, whether ceramic, chemically or reaction-bonded, whether solid or insulating – STEULER-KCH supplies refractory bricks using a wide variety of raw materials and bonding methods.

REFRACTORY MONOLITHICS: Whether mortars or concretes, whether for casting, ramming or gunning, whether dense or insulating – we supply unshaped materials too.

PREFABRICATED ELEMENTS: No geometry is too complicated, no component too heavy. Whatever cannot be pressed is stamped or cast.

REFRACTORY ACCESSORIES: Metallic anchors or ceramic fibres – everything that belongs to a refractory lining is part of STEULER-KCH's portfolio too.

REFRACTORY ENGINEERING: We design, simulate and evaluate in advance everything that needs to withstand the rigours of the steel industry.

If you would like to find out more, please contact one of our staff. We would be more than happy to discuss the backgrounds and details with you.

Kai Schwickert
Head of International Markets
+49 2623 600-409
Kai.Schwickert@steuler-kch.de

Klaus-Guido Ruwier
Technical Director, Refractories
+49 2624 13-450
Klaus-Guido.Ruwier@steuler-kch.de

Werner Schönwelski
Development and Application Technology
+49 2624 13-535
Werner.Schoenwelski@steuler-kch.de

WWW.STEULER-KCH.COM

STEULER KCH

REFRACTORY LININGS

WHAT ARE WE ACTUALLY DOING IN THE STEEL INDUSTRY?

STEULER-KCH GMBH
REFRACTORY LININGS
56427 SIERSHAHN I GERMANY
PHONE: +49 2623 600-586
E-MAIL: FF.INFO@STEULER-KCH.COM

FOCUS ON PERFORMANCE

STEEL IN STEEL

REFRACTORY SOLUTIONS FOR THE IRON AND STEEL INDUSTRY

The iron and steel industry is the world's largest consumer for refractory materials. Something that's immediately apparent to anyone who has ever visited a steel plant is that everything there is big, noisy, extremely heavy and above all: hot! From the pre-processing of raw materials, the smelting in the blast furnace, the melting of the steel and the metallurgical treatment, to the casting and post-casting process and finally forming and heat treating of the steel products - every stage of the manufacturing process occurs at high temperatures.

The diverse requirements of this key industry, with its specialised production and processing plants, mean every supplier of refractories must offer a comprehensive range of materials, lining technologies and expertise. We supply refractory solutions for every stage of the production process - from plants used for pre-processing the raw materials, sintering plants and pelletisers in coke plants, the various processes used to manufacture pig iron, to convert pig iron into steel and ultimately refine and form the steel in rolling mills and forges.

Performance, efficiency, durability, resilience, service life – these are the criteria by which refractory linings are judged. In order to meet these requirements, we are continually improving our refractory linings while simultaneously keeping an eye on optimising the manufacturing processes and maximising plant availability.

Our manufacturing programme comprises refractory bricks based on a variety of raw materials, such as refractory clay, andalusite, bauxite and corundum, including chromium, zirconia, magnesia and SiC materials, as well as unformed products, like mortars and concretes. Having our own manufacturing facilities staffed by qualified specialists in the fields of mould making and manufacturing affords us a great deal of flexibility. We can fulfil all requirements, from large-volume production to individual shaped bricks, to complete lining systems using both plastic forming and dry press methods.

We develop a comprehensive refractory concept for each plant based on the steel construction drawings and process data provided. Our scope of services includes the creation of installation drawings, performing process simulations and thermal conductivity calculations including heating-up recommendations as well as on-site installation and supervision.

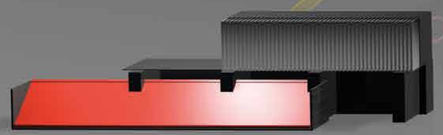
FROM THE ORE TO THE STEEL

BLAST FURNACES

The blast furnace is both at the heart of, and symbolic of, the steel industry. Blast furnaces are where the pre-treated iron ore is converted into liquid pig iron in a continuous process. The linings used are made from high-alumina materials, SiAlON and nitride-bonded materials as well as insulating materials and refractory concrete, according to installation location and stresses they are subjected to. We offer the appropriate refractory materials required for blast furnace peripheral plants, such as Cowper stoves, hot blast and flue gas ducts too.

In the throat of the blast furnace, into which ore, coke and flux are added, the mechanical stresses are withstood by highly wear-resistant corundum and andalusite bricks that are pre-fired at up to 1,700 °C and are highly resistant to temperature changes. In the stack underneath, special shaped bricks made from refractory clay and andalusite are used that are characterised by excellent resistance to reducing atmospheres.

The smelting zone of the blast furnace is exposed to extreme thermal stresses. For this special and highly stressed area, we supply shaped bricks made from chemically bonded andalusite grades. The bottom of the blast furnace, the hearth, is lined with multiple layers of carbon bricks. In order to protect this material from the pig iron, we provide low-iron refractory materials with outstanding corrosion resistance for the „ceramic cup" of the blast furnace.



PELLETISING | SINTERING | COKE PLANT

Iron ores are coalesced into pellets or sinter for the blast furnace. Pelletizing involves iron ore fines being formed into balls using binders and fired in a shaft or rotary kiln. In strand sintering plants, the fines are agglomerated into irregular ore nodules using binders and flux.

The most important source of carbon used in the production of iron is furnace coke. This is generated in coking plants by heating coal in an oxygen-deficient atmosphere. The inside of the coke oven is lined with fire clay or silica bricks. Owing to their extremely high mechanical strength, Steuler K-Plates have become established worldwide as the premium lining for coke discharge slide. K-Plates are wear-resistant and weatherproof as well as being highly resistant to temperature changes.

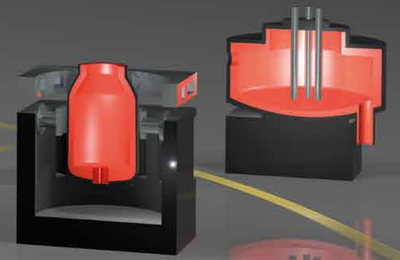
TRANSPORT LADLES | TORPEDO LADLES

Torpedo ladles are used to transport the liquid pig iron, often over long distances, from the blast furnace to the steel plant for further processing. The often demanding mechanical requirements that the refractory lining of these transport vehicles have to meet can be fulfilled by resin-bonded materials, for example. The longer service lives of our andalusite and bauxite bricks lower the cost of transporting pig iron in torpedo ladles. We also supply refractory concretes for special areas and for making repairs.

DIRECT REDUCTION PLANTS

In contrast with the blast furnace process, the direct reduction method operates at lower temperatures of up to 1,000 °C and produces so-called sponge iron rather than liquid pig iron like a blast furnace. The ores are reduced by means of reducing gases (hydrogen and carbon monoxide) that are generated from natural gas in a reformer. This produces solid sponge iron that can be either hot or cold briquetted. The sponge iron is then usually processed into steel in electric arc furnaces, but can alternatively be melted and processed into steel in a converter.

We supply custom solutions for all the different sections of the plant, from the process gas and air heating equipment and reformer to the reduction furnace itself, and work in close collaboration with many renowned plant engineering firms. The demand for innovative refractory concepts that increase plant efficiency is on the rise. We have individual solutions on hand that make use of a variety of material grades for all the different plant equipment used in the direct reduction process.



CONVERTERS | ARC FURNACES | STEEL LADLES

The converter is where the majority of the carbon contained in the pig iron is burnt off by blowing oxygen through it, and impurities, such as silicon, sulphur and phosphorous, are converted into slag. In this way, pig iron becomes steel. We use high-alumina grades, nitride-bonded and magnesia-carbon materials here that result in a significant increase in service life.

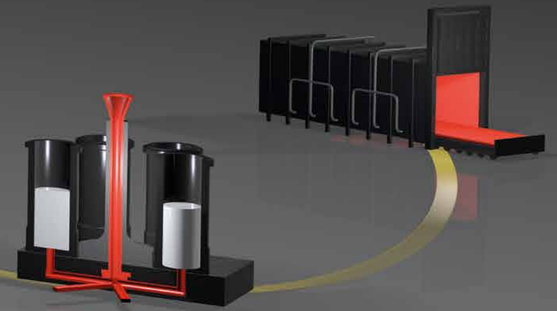
Arc furnaces are used to either melt scrap steel or process sponge iron from the direct reduction process to raw steel. We supply high-alumina brick grades, magnesia-carbon brick linings, prefabricated refractory shapes and concretes for these plants. Bricks with chromium oxide additive are used for the lid of the arc furnace.

Steel ladles serve as a means of transport during the steel manufacturing process and are used to achieve the desired properties of the final steel product through secondary metallurgical treatment (e.g. alloying). Various grades of bricks are available for this purpose as well as slide gates, functional components and concretes.

ANNEALING FURNACES | FORGING FURNACES

The steel ingots, slabs and profiles are mechanically worked to produce strips, heavy plates, profiles, rods, wire rods, bright steel or free-form forged parts. The steel ingots are heated several times in the furnace beforehand so that they can be made into the desired end product.

Furthermore, the additional heat treatment imbues the steel with important tempering properties. Directly bonded 99% corundum bricks have a proven track record in furnaces with special gas atmospheres (e.g. hydrogen environment) too.



CONTINUOUS CASTING | INGOT CASTING

For the continuous casting of rods, profiles, slabs or sheets, liquid steel is poured from the furnace ladle via a tundish into a water-cooled mould. After solidifying, the steel slab is cut to the desired length. We make the refractory linings out of high-alumina and nitride-bonded materials and supply construction elements and refractory concretes.

In the case of ingot casting, moulds (ingot moulds) are filled with liquid steel via a refractory channel system, generally from below (bottom teeming) or, in rare cases, from above (top teeming). New ceramic duct and distribution systems are constructed for each cast. We offer high-alumina duct systems for bottom teeming. Modern ingot casting steelworks place great value on high-quality refractory products for ingot teeming, because it is crucial to prevent contamination of the steel ingots caused by the refractory materials. By the same token, the steel ingots must have a consistent chemical composition and homogeneous structure. Our experienced industrial application engineers use software to simulate flow, temperature, solidification, blowhole formation and micro-porosity in order to develop the ideal format design for the production environment in question.