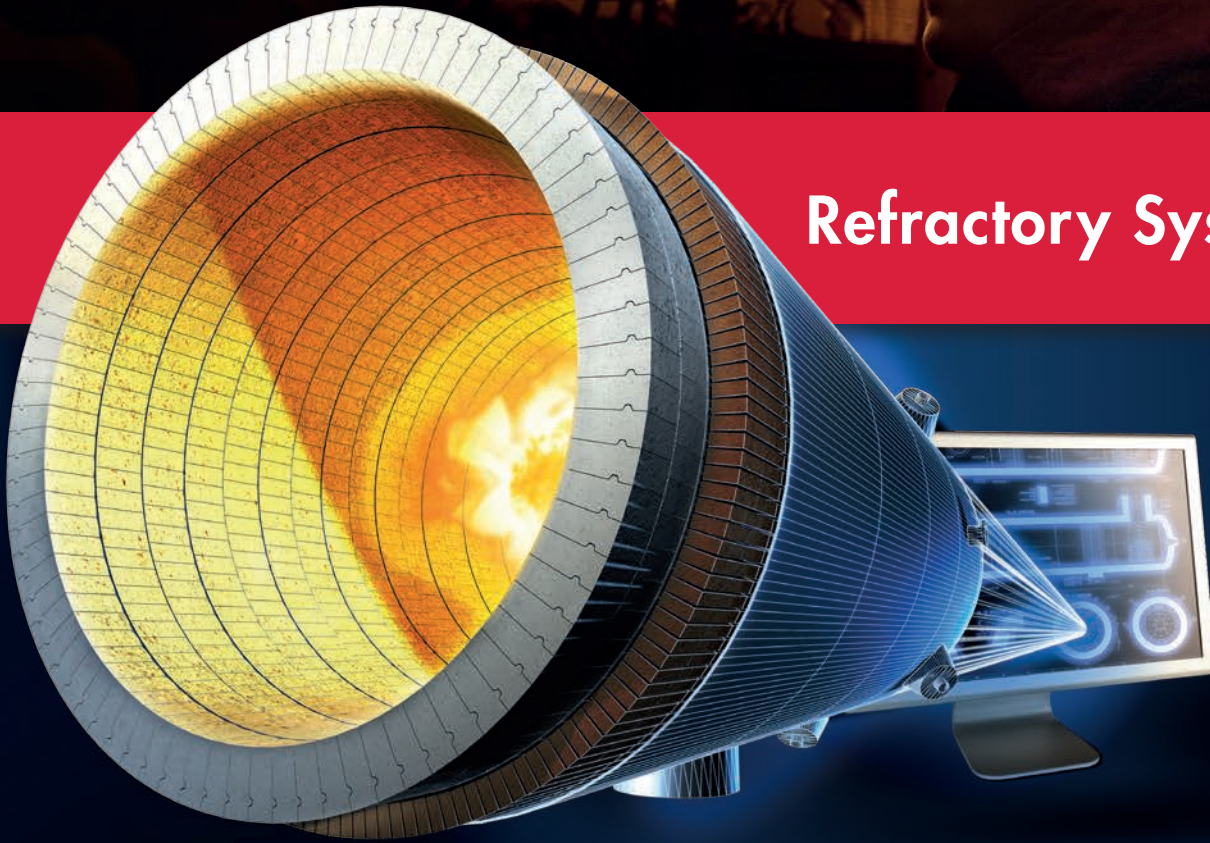


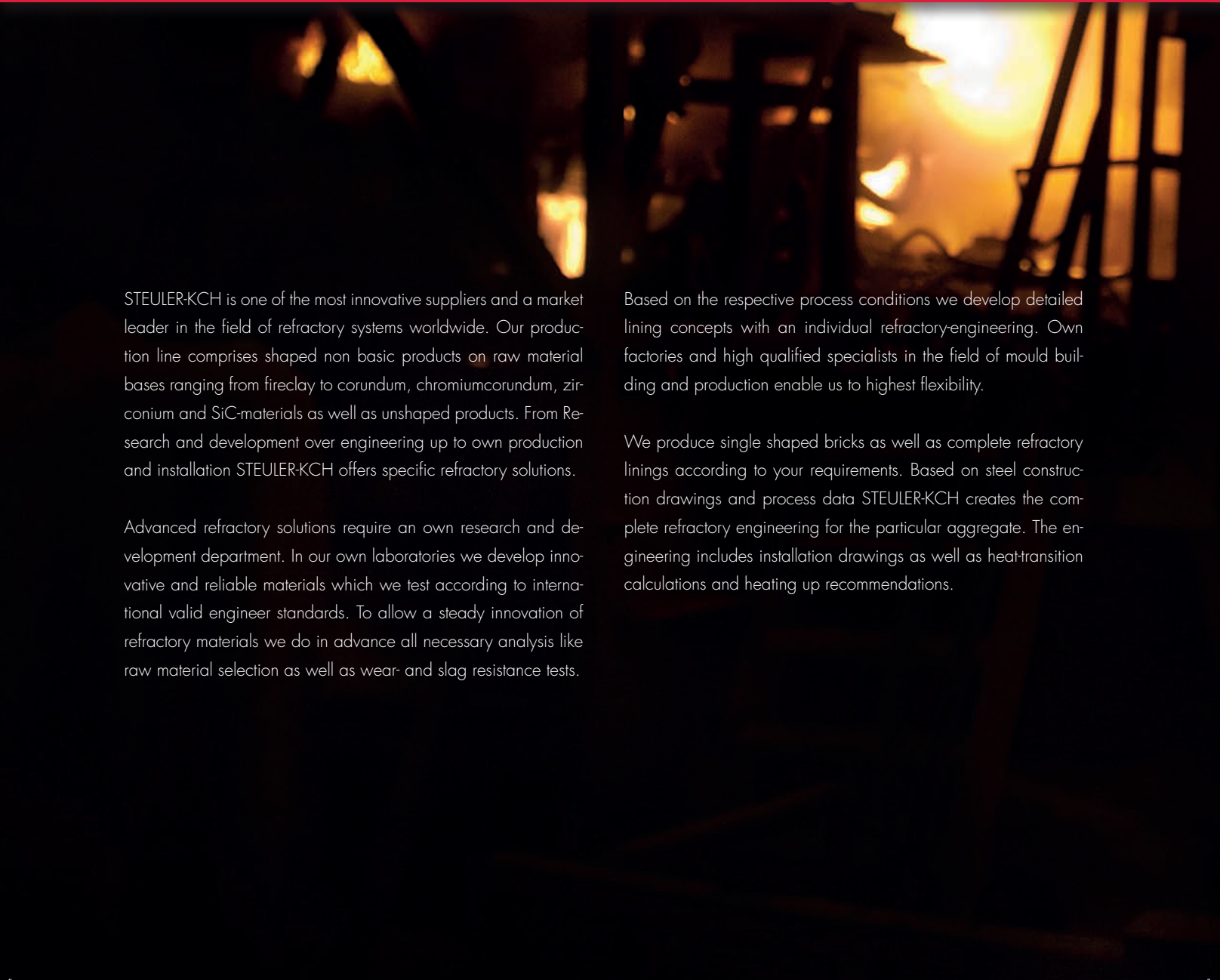


Refractory Systems





Complete refractory engineering, material supply, and installation from one source



STEULER-KCH is one of the most innovative suppliers and a market leader in the field of refractory systems worldwide. Our production line comprises shaped non basic products on raw material bases ranging from fireclay to corundum, chromiumcorundum, zirconium and SiC-materials as well as unshaped products. From Research and development over engineering up to own production and installation STEULER-KCH offers specific refractory solutions.

Advanced refractory solutions require an own research and development department. In our own laboratories we develop innovative and reliable materials which we test according to international valid engineer standards. To allow a steady innovation of refractory materials we do in advance all necessary analysis like raw material selection as well as wear- and slag resistance tests.

Based on the respective process conditions we develop detailed lining concepts with an individual refractory-engineering. Own factories and high qualified specialists in the field of mould building and production enable us to highest flexibility.

We produce single shaped bricks as well as complete refractory linings according to your requirements. Based on steel construction drawings and process data STEULER-KCH creates the complete refractory engineering for the particular aggregate. The engineering includes installation drawings as well as heat-transition calculations and heating up recommendations.

- Research and development, engineering, production and installation from one source
- Detailed lining concepts and refractory engineering
- Highest flexibility in the field of mould building and production
- Complete refractory-layout including installation drawings, heat-transition calculations and heating-up recommendations
- Complete erection or installation supervision through STEULER-KCH-Supervisors



Above: STEULER-KCH develops customized refractory-concepts with most modern CADengineering.



Above: Abrasion and slagging analysis of the refractory materials.

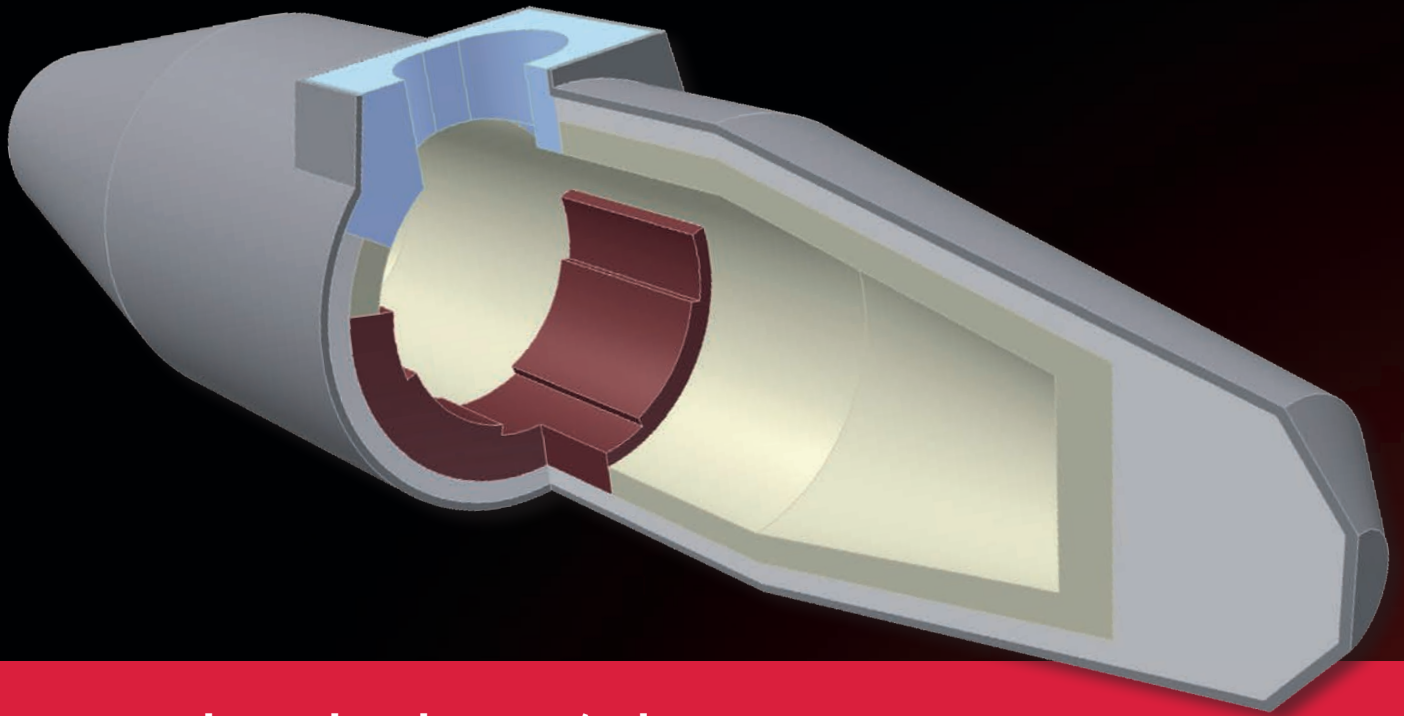


Above: Moulds produced in our own workshops provide STEULER-KCH with utmost flexibility in the production of special formats.

- Iron and steel industry
- Non-ferrous metallurgy
- Thermal waste treatment
- Chemical and petrochemical industry
- Cement and lime industry
- Roof and wall lining concepts with ceramic anchoring systems
- Special shape bricks / special applications
- Ceramic industry and powder metallurgy



Above: STEULER-KCH also offers erection services thereby ensuring the qualified implementation of the refractory system design



Iron and Steel Industry / Blast Furnances Direct Reduction Furnances

Refractory linings for blast furnances

STEULER-KCH offers an extremely wide range of materials for lining blast furnances depending on the specific installation conditions and loading. Highly wear-resistant and temperature change-resistant corundum brick pre-fired at up to 1700 °C withstands the mechanical stresses in the top of the blast furnace where the burden is introduced. The reduction zones below that use special shaped bricks made of fireclay and andalusite which provide outstanding reduction resistance.

The highest temperatures and the pressure of the column of burden subject the melting zone of the blast furnace to extremely high stresses. For this special high-stress application, STEULER-KCH supplies shaped brick annuli in chemically/ceramicly bonded andalusite grades. The bottom of the blast furnace, the hearth, is lined with multiple layers of carbon brick. In order to protect that material from the pig iron, STEULER-KCH provides low-iron, high temperature-resistant fireclay and andalusite grades for the „ceramic cup“ of the blast furnace along with high-refractory sintered mullite grades with outstanding corrosion resistance.

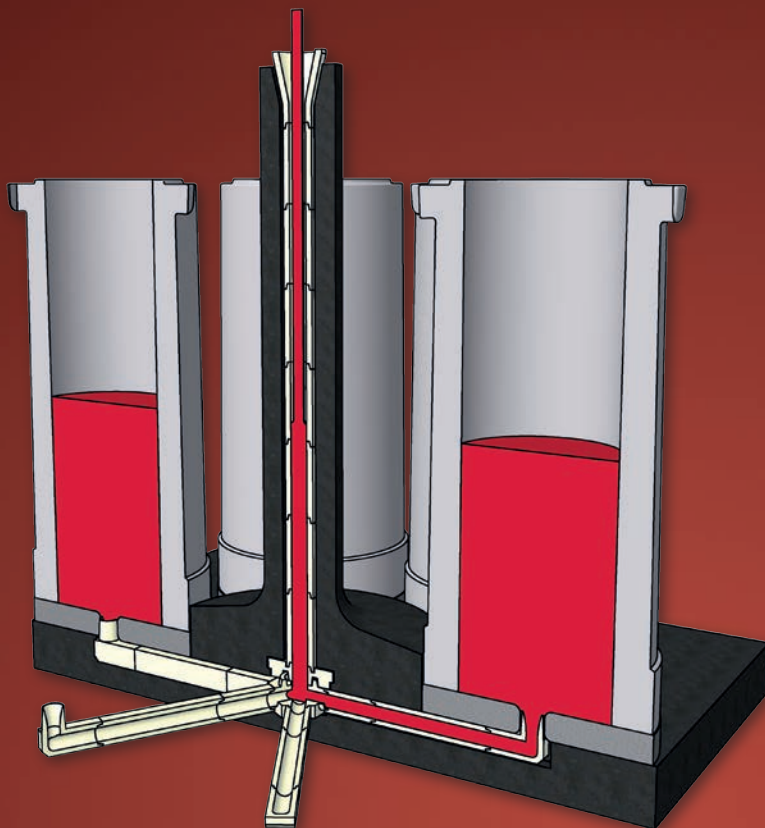
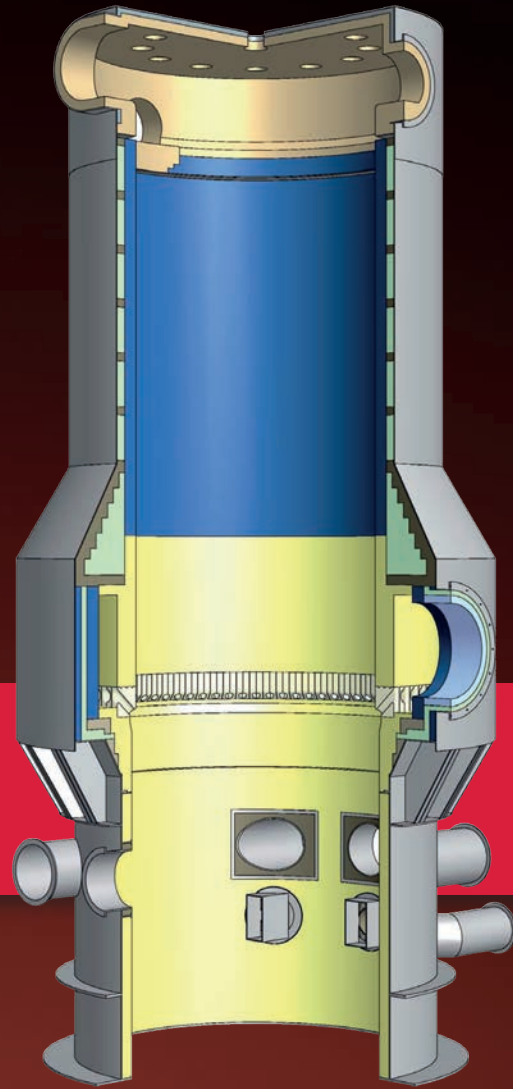


Left: blast inlet

Innovative refractory concepts for direct reduction

For the direct reduction process, STEULER-KCH supplies individual solutions for all kinds of aggregates – ranging from air and process gas heaters to the reformer to the key component of the plant, the reduction furnace. There is an increasing demand for innovative refractory concepts to raise the efficiency of the plants. Now in addition to the high stresses already imposed on the refractory lining by the reducing atmosphere and temperature changes, material throughputs beyond the originally planned capacity also cause increased levels of abrasion.

Right: State-of-the-art brickwork lining concepts for Midrex® shaft furnaces

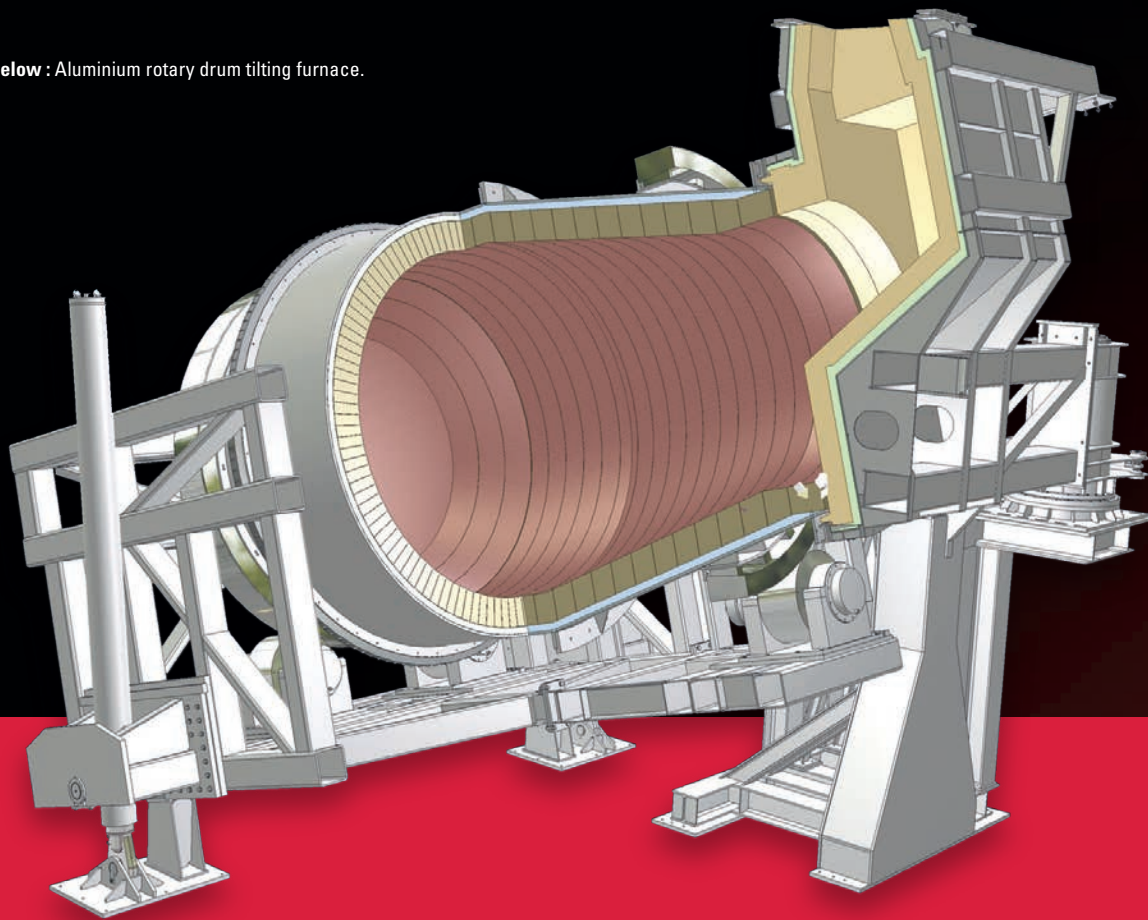


Refractory products for ingot casting

Modern ingot casting steelworks need extremely high quality refractory products to line the channels feeding their moulds. The steel blocks must be free of non-metallic inclusions and also have a consistent chemical composition and a homogenous structure.

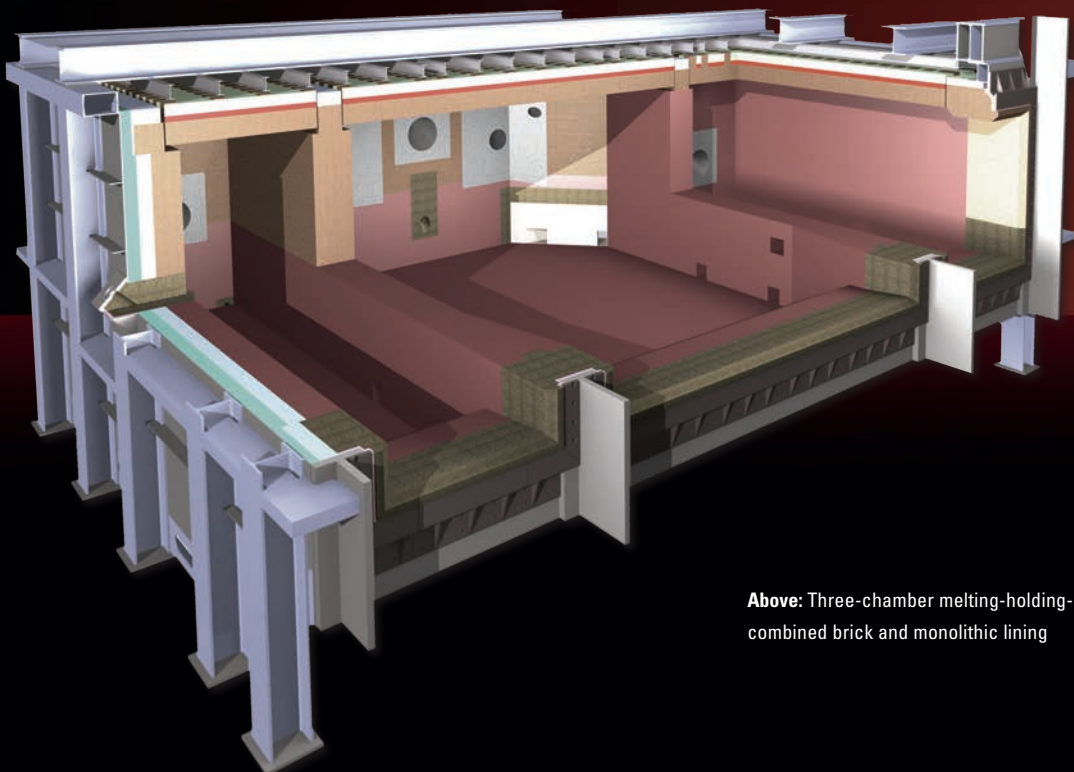
With high quality, high alloy steels such as manganese steels, STEULER-KCH relies on the material B 80UG with a reaction-bonded mullite matrix and free SiO_2 contents of less than 1.5%. The use of these refractory materials keeps the casting channels from widening and prevents alumina inclusions.

Below : Aluminium rotary drum tilting furnace.



The Refractory Division of STEULER-KCH designs, produces and supplies a very diverse range of lining materials for the non-ferrous metal industry, e.g. for copper and aluminium melting and treatment furnaces.

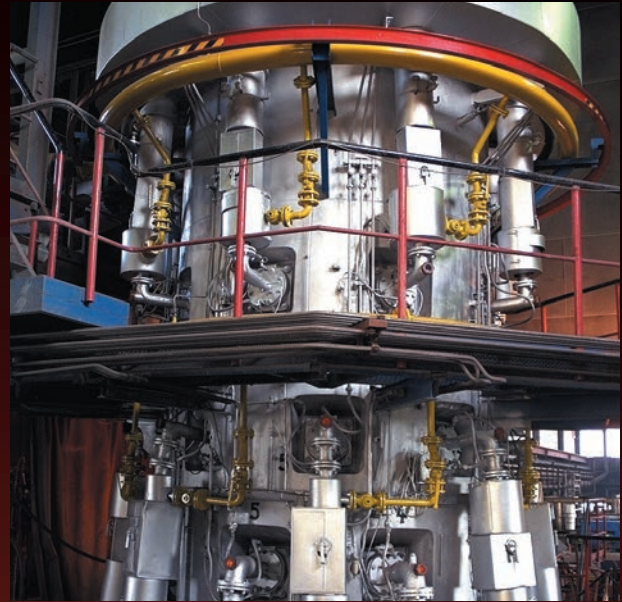
These materials have to resist not only thermal stresses but also aggressive abrasive and chemical attacks. For roasting and melting furnaces and also for holding and casting facilities in the non-ferrous metal industry, refractory linings are supplied from the company's own production. These linings withstand extremely aggressive chemical conditions – refractory materials and engineering from STEULER-KCH are also well established in these applications.



Above: Three-chamber melting-holding-casting furnace in combined brick and monolithic lining

Long service life in copper shaft furnaces

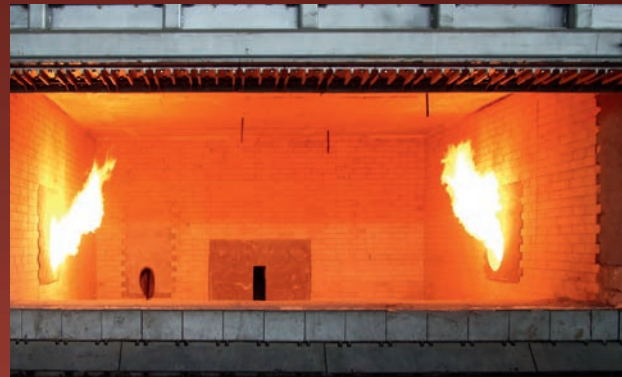
In the secondary copper industry, ceramic bonded SiC materials provide long service life in shaft- and casting furnaces. Also chromium-corundum bricks are successfully used in this application. Different production processes also enable STEULER-KCH to produce large scale segment bricks for the lining of shaft kilns with a stable high grade quality.



Non-ferrous Metallurgy

Special qualities for the aluminium industry

For the melting and holding furnaces of the aluminium industry, STEULER-KCH has developed special phosphate-bonded bauxite grades for the application in the upper bath area. The company offers high-quality fire clay and andalusite grades for use in the bath area itself and for the burners. In this area, STEULER-KCH offers lining concepts which are tailored to the specific application, combining brick- and monolithic linings.



Above: Trolley melt furnace with brickwork wear lining.



Rotary kiln

The rotary kiln is the heart of every incinerator. The refractory lining in this part of the plant is subject to extreme conditions.

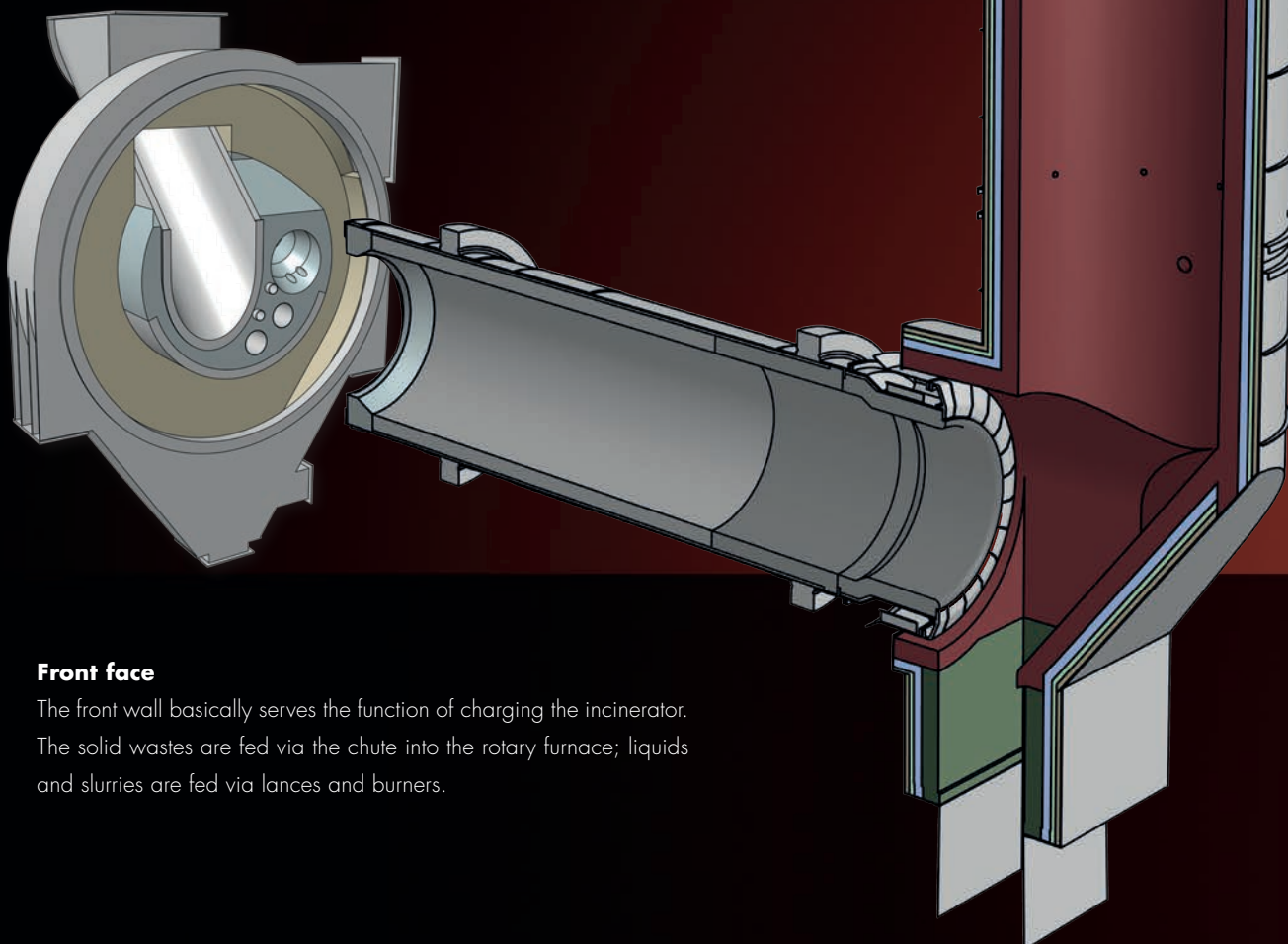
Inlet and transition zone

In connection with the operation of the rotary kiln, the stresses imparted on the refractory lining are primarily mechanical. STEULER-KCH uses materials with high abrasion resistance and pressure resistance in this zone.

Main combustion zone and discharge

At combustion chamber temperatures of up to 1400 degrees Celsius, aggressive slag and changing operating conditions exert extreme stresses on refractory materials.

Thermal waste treatment



Front face

The front wall basically serves the function of charging the incinerator. The solid wastes are fed via the chute into the rotary furnace; liquids and slurries are fed via lances and burners.

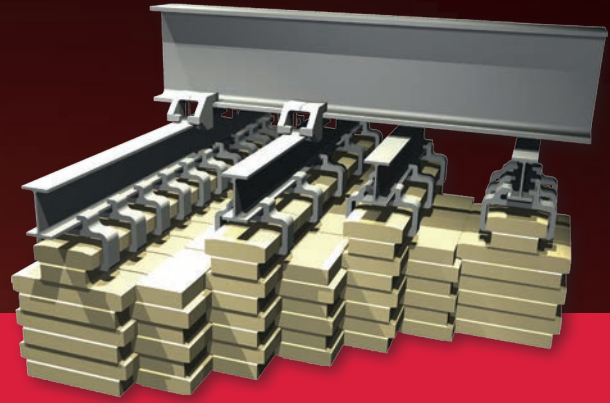
Post combustion chamber

In the post combustion chamber, the refractory brick lining is generally subject to very harsh chemical stress from highly alkali conditions. In combination with high combustion chamber temperatures of up to 1350 degrees Celsius, liquid slag severely erodes the brick.



Post combustion chamber ceiling, ceiling boxes and accessory components

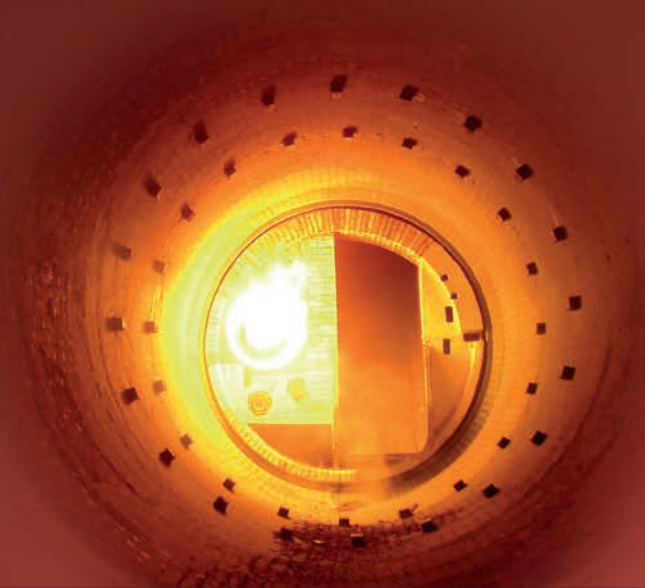
STEULER-KCH designs, supplies and installs refractory ceiling systems not only based on dry-pressed shaped brick but also as monolithic linings. The range of heat-resistant cast and steel components and ceramic anchoring bricks offered suggest many possible solutions depending on the specific loading



Waste gas and waste water incinerators

Liquid waste and waste gas incinerators with both high firing temperatures and harsh chemical conditions require special refractory materials. Also for these process plants, STEULER-KCH supplies highly wear-resistant materials for front wall brickwork and permanent lining.

Moreover, the scope of goods and services of STEULER-KCH also includes cost-effective solutions for wood, sewage sludge and household waste incinerators.





Above: Sulphuric acid cracking unit completely lined by STEULER-KCH refractory materials.

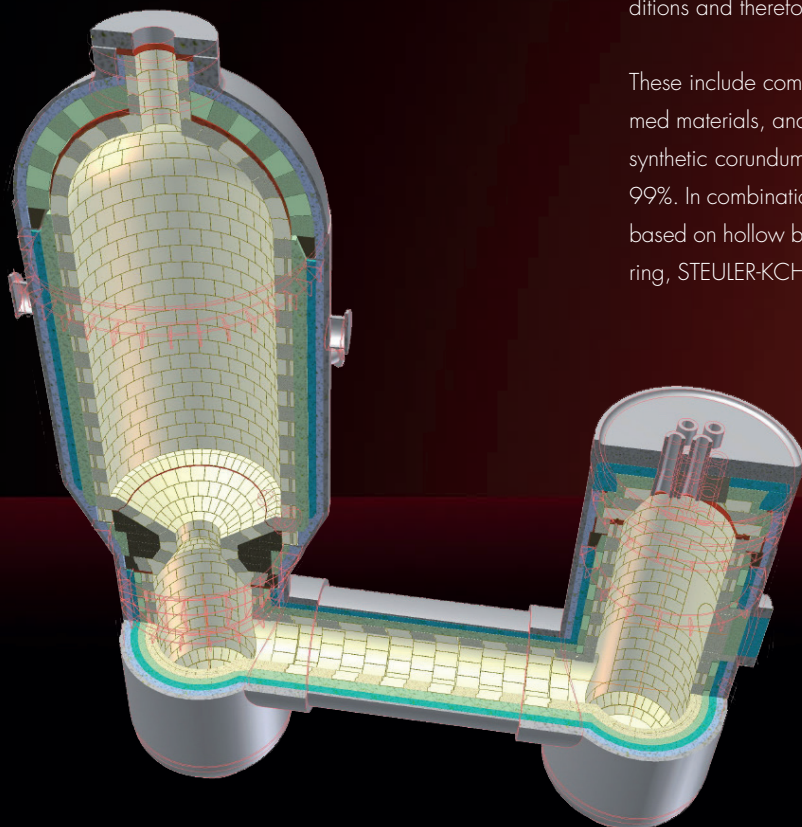
Claus plants

Claus plants are used for the industrial recovery of sulphur from sulphur hydroxides found in the flue gases generated while processing coal into coke. Claus plants are also used in the desulphurisation of crude oil in refineries.

For the lining of a Claus furnace, the specially developed refractory ceramics supplied have to withstand different conditions depending on how they are installed in the furnace unit. Low-iron fireclay and andalusite are used here – and under extreme loadings also corundum grades.

Chemical and petrochemical industry

Below: Pox-reactor in the petrochemical industry



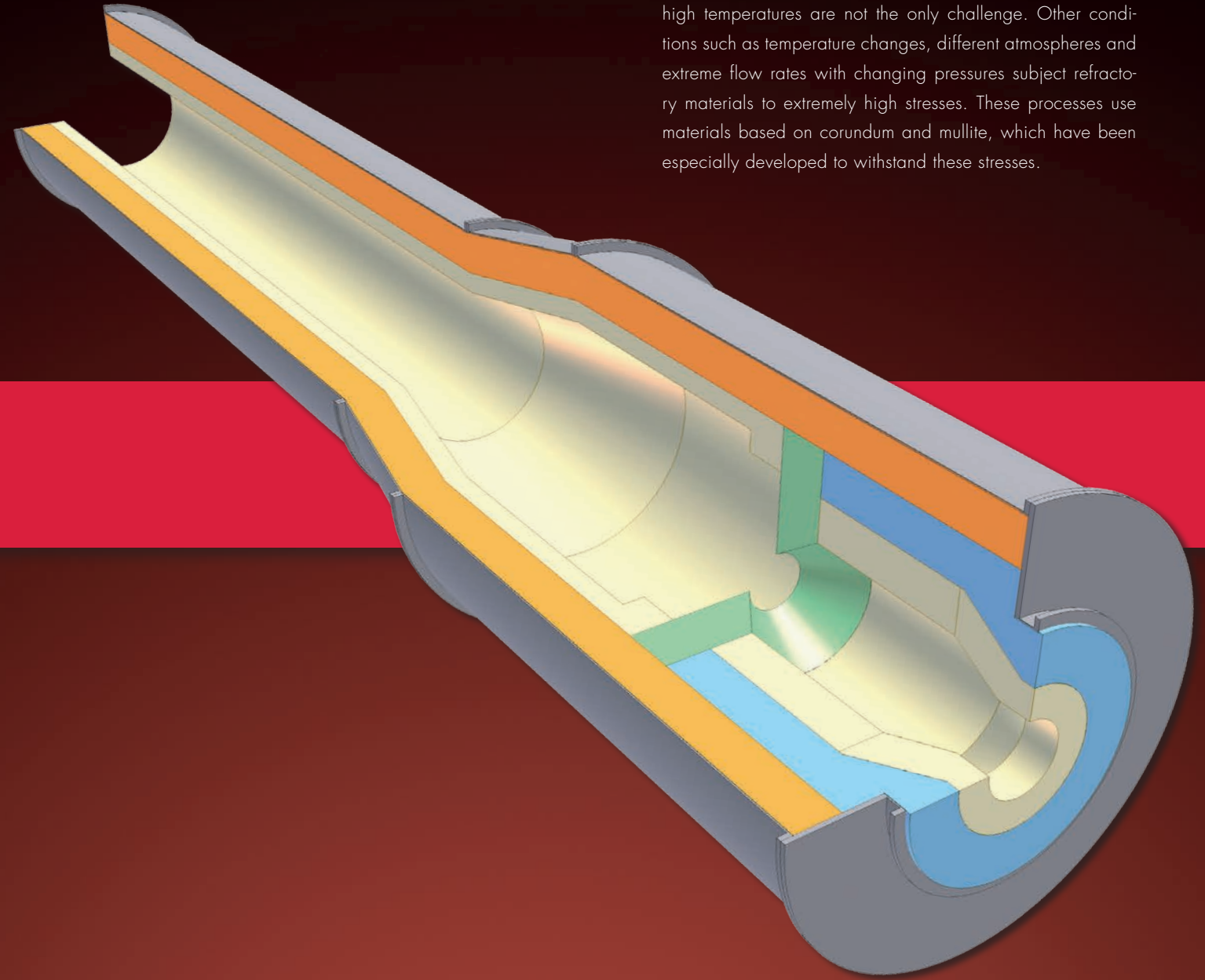
Pox reactor

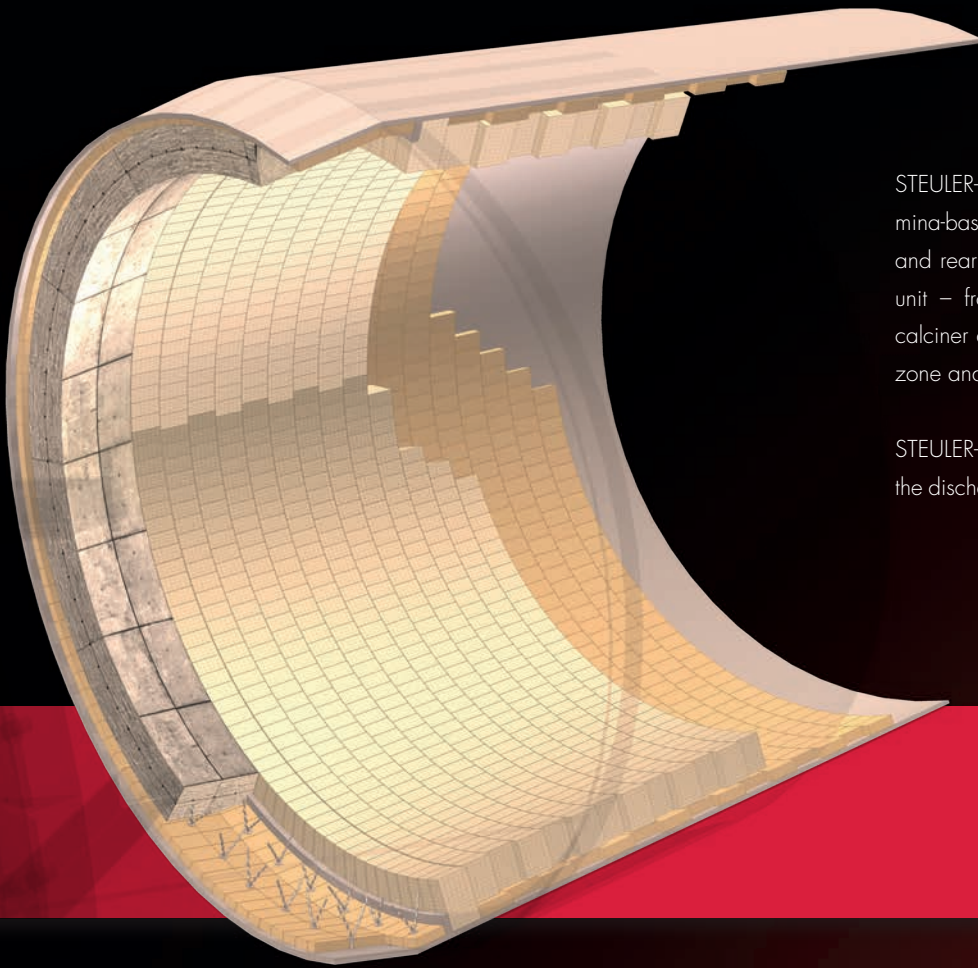
The processing plants used in the petrochemical industry, such as primary and secondary reformers, cracking furnaces and POX reactors are subject to an extremely wide range of loading conditions and therefore also require different refractory materials.

These include complete fibre linings, combination linings with formed materials, and pure, high-quality speciality products made of synthetic corundum materials with an Al_2O_3 content of more than 99%. In combination with similarly high-quality insulation materials based on hollow bead corundum and very sophisticated engineering, STEULER-KCH offers complete concepts from a single source.

Carbon Black Reactor

In the production of carbon black, process reactor temperatures of up to 2000 °C are reached. This can only be achieved using specially developed high-temperature ceramics. And high temperatures are not the only challenge. Other conditions such as temperature changes, different atmospheres and extreme flow rates with changing pressures subject refractory materials to extremely high stresses. These processes use materials based on corundum and mullite, which have been especially developed to withstand these stresses.





STEULER-KCH supplies all types of alumina-based linings along with insulation and rear linings for the complete cement unit – from the heat exchanger to the calciner and tertiary air line to the safety zone and the upper transition zone.

STEULER-KCH products are also used in the discharge zone, kiln hood and cooler.



Above: Installation of STEULER-KCH refractory lining

Left: White Liquor Plant at UPM Uruguay S.A., Fray Bentos, Uruguay.
Photo by ANDRITZ



Above: White Liquor Plant at Veracel Celulose S.A., Três Lagoas, Brazil. Photo by ANDRITZ

Cement, paper and cellulose industry

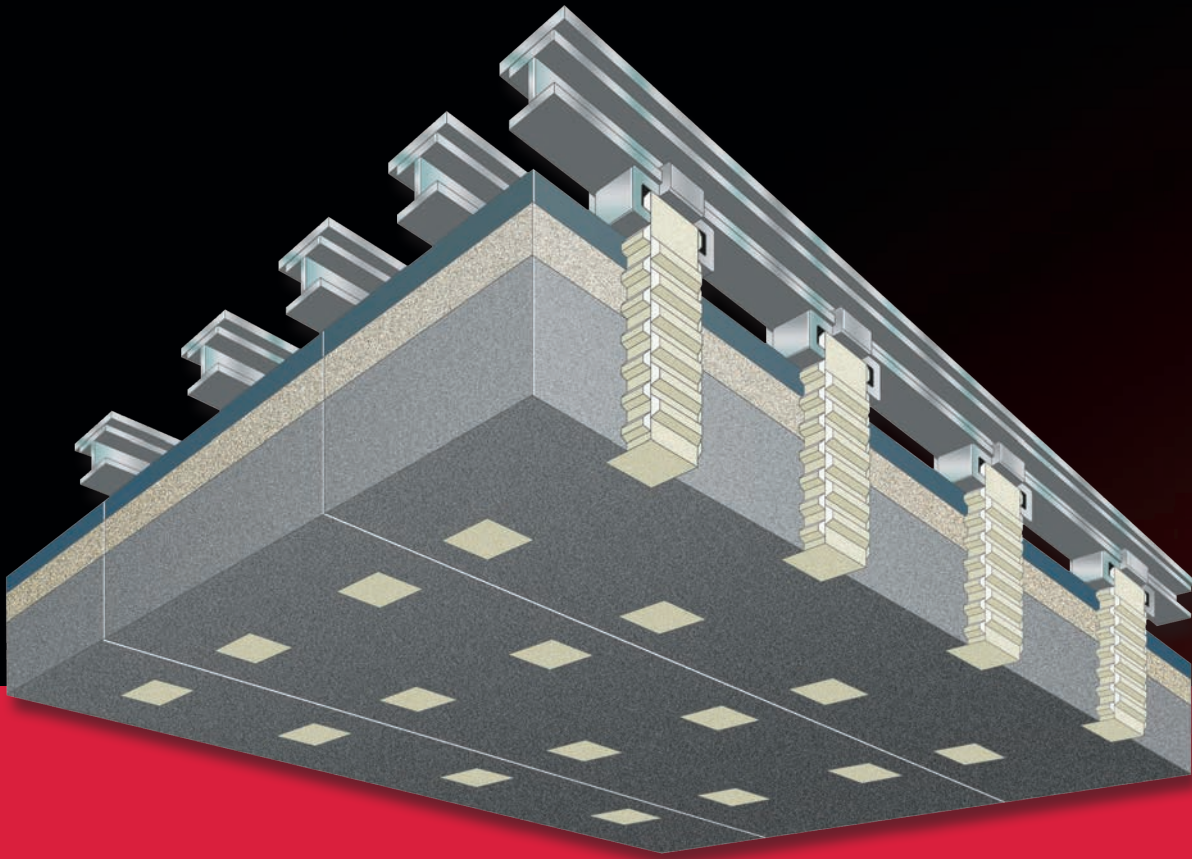
Reduction resistant materials for the lime industry

Andalusite and fireclay bricks are used in the lime industry for both shaft furnaces and rotary kilns. With their particularly low iron content, the high-fired fireclay grades of STEULER-KCH are exceptionally abrasion-resistant. For that reason, this type of brick is mainly used in the firing and transition zones of these kilns.

Special fireclay grades are also available for the charging and cooling zones.

Because of the large dimensions of these kilns, specially shaped bricks in tongue-and-groove design are very often used here.





Anchoring brick

STEULER-KCH develops and produces anchoring brick for suspended ceilings, ceiling boxes and walls for the anchoring of monolithic materials. Anchors must be used to secure monolithic delivery system components depending on their dimensions and arrangement. The anchors are part of the refractory lining and attach it to the steel structure. The individually anchored elements can be replaced as necessary without threatening the integrity of the adjacent lining. STEULER-KCH anchoring bricks are suitable for use wherever metal anchoring systems cannot be used due to high temperature loading or strong chemical attack from the combustion atmosphere.

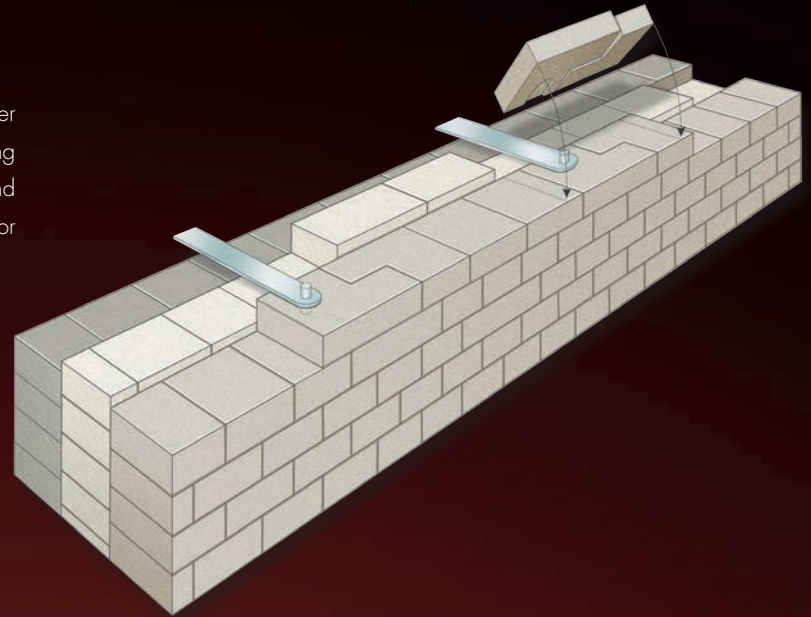
The ceramic anchoring brick is anchored to the steel structure by means of holding clamps, hangers or threaded retainers which are matched to the product and the application case.

The type and geometry of the anchor selected depends on many factors:

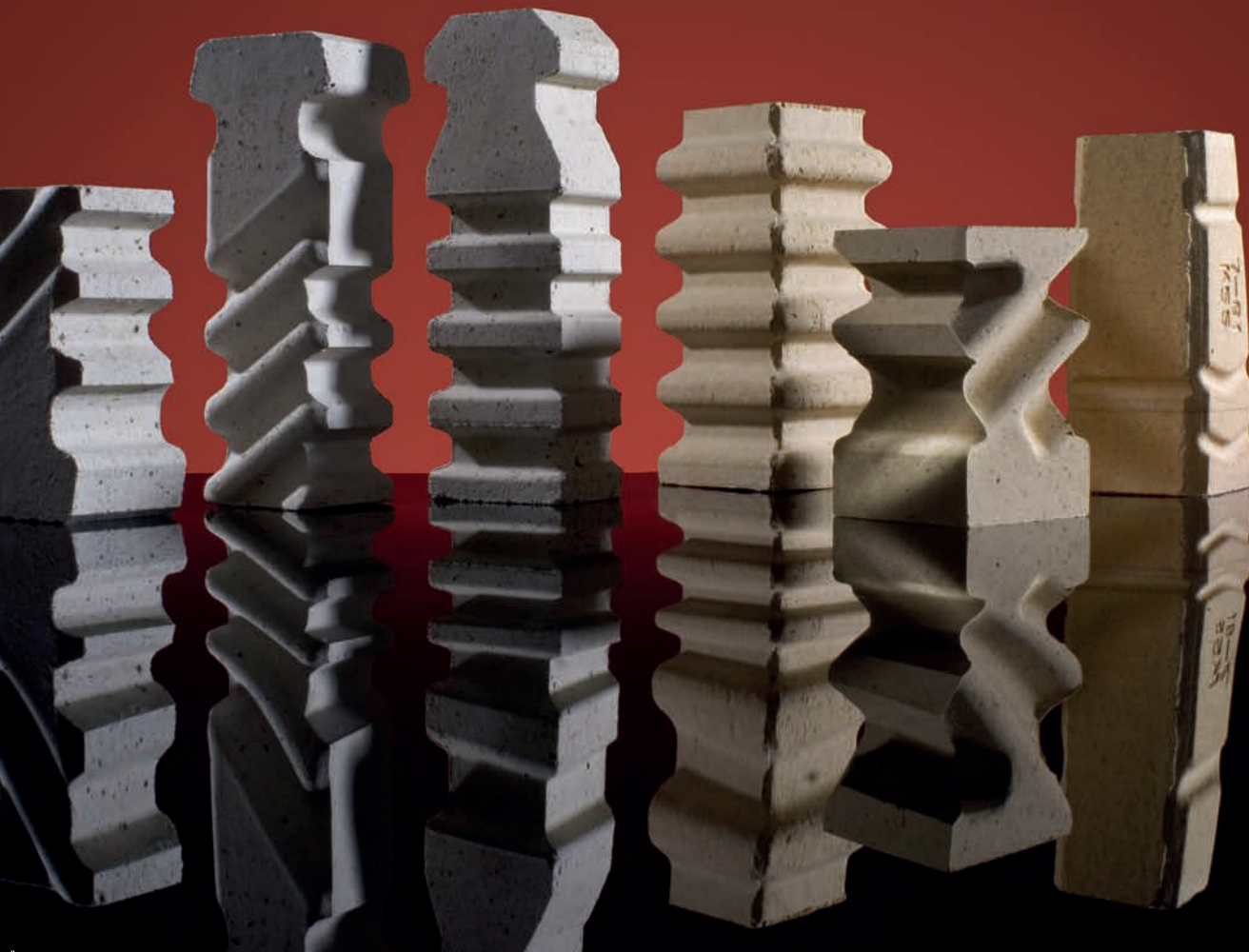
- **Application temperature, service temperature**
- **Quality of the monolithic materials**
- **Wear profile of the unit**
- **Furnace chamber atmosphere**
- **Thermodynamic calculations**

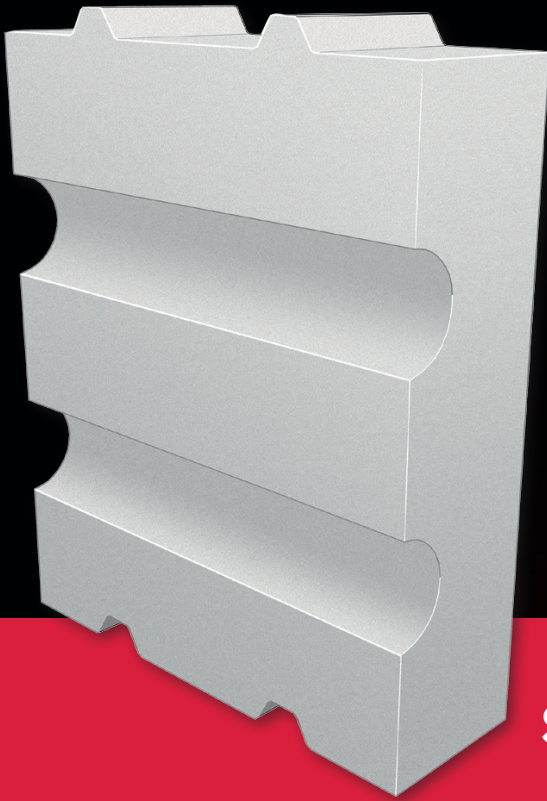
STEULER-KCH FE fastening and expansion joint systems

Nearly all refractory brickwork requires expansion joints in order to compensate for stresses incurred while heating up and cooling down. STEULER-KCH develops and produces FE fastening and expansion joint systems in different dimensions and qualities for many types of furnaces.



Roof- and wall constructions with ceramic anchoring systems





Dry-pressed tongue-and-groove STEULER-KCH chimney bricks in special grades according to DIN 1057 protect against damage caused by thermal and chemical stress from flue gases as they flow through the chimney. STEULER-KCH chimney bricks feature very good dimensional accuracy, mechanical strength and high acid-resistance.

Shapes bricks and special applications

Power plants

Back-drawing shafts of brown coal fired power plants are lined with STEULER-KCH fireclay bricks and high abrasive resistant monolithic materials. SiC-castables and chromium-corundum materials find their application in melting chamber boilers. STEULER-KCH offers hand-rammed and pressed shaped bricks for special applications (e.g. burner blocks, nozzle bricks or taper bricks). By producing bricks with the hand-ramming method it is possible to manufacture very small series and most complex geometries of alumina- and SiC containing bricks. From the engineering over the building of the required moulds up to the production you get everything from one source. Special shaped bricks are available in all our refractory material qualities.



Right: Brick-lined stack in a power plant.

Metal recovery, titanium dioxide production, activated carbon

For many industries and special applications, STEULER-KCH supplies a broad range of alumina-based products as material for wear linings, backup linings or insulation which can be adapted to meet the specific requirements.

For example, STEULER-KCH develops special, chemically bonded andalusite grades for zinc recovery plants – grades which offer outstanding service life in rotary kilns. Alkali-resistant materials are used in the dust chambers.

In titanium dioxide production STEULER-KCH offers andalusite and fireclay grades as lining materials for rotary kilns and fluidised bed plants.

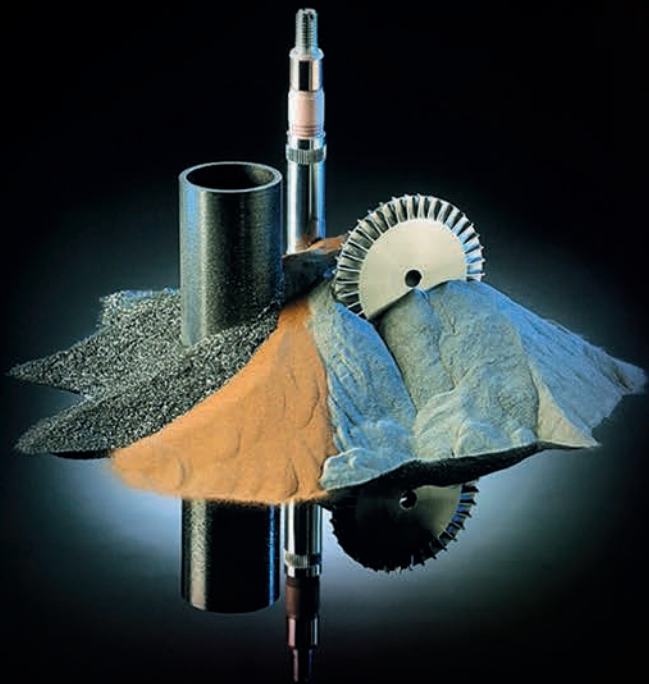
The production and reactivation of activated carbon uses reduction-resistant fireclay and andalusite grades which satisfy the high demands relative to temperature change-resistance and safety. STEULER-KCH relies on special fireclay grades for the production of barium carbonate.



Above: Fully refractory lined rotary kilns for the recycling of zinc.

Below: Burner bricks, pocket blocks, anchor bricks and other shapes in various material qualities.





Powder metallurgy

Our customers take advantage of our decades of experience and the continuous advances made by our research and development departments, thereby extending service life and reducing operating costs. In combination with thermal, mechanical and chemical requirements, the geometries designed to satisfy customer specifications are considered together as a complete, rational and qualitative system. The use of special kiln furniture, for example, can also minimise post-processing costs for sintered powder metal parts, because the more even the firing slab, the more even the moulded part after heat treatment. Only ceramic firing slab materials provide satisfactory firing results. STEULER-KCH manufactures kiln furniture using the dry pressing method only, so tolerances are very small.

Ceramic industry and powder metallurgy

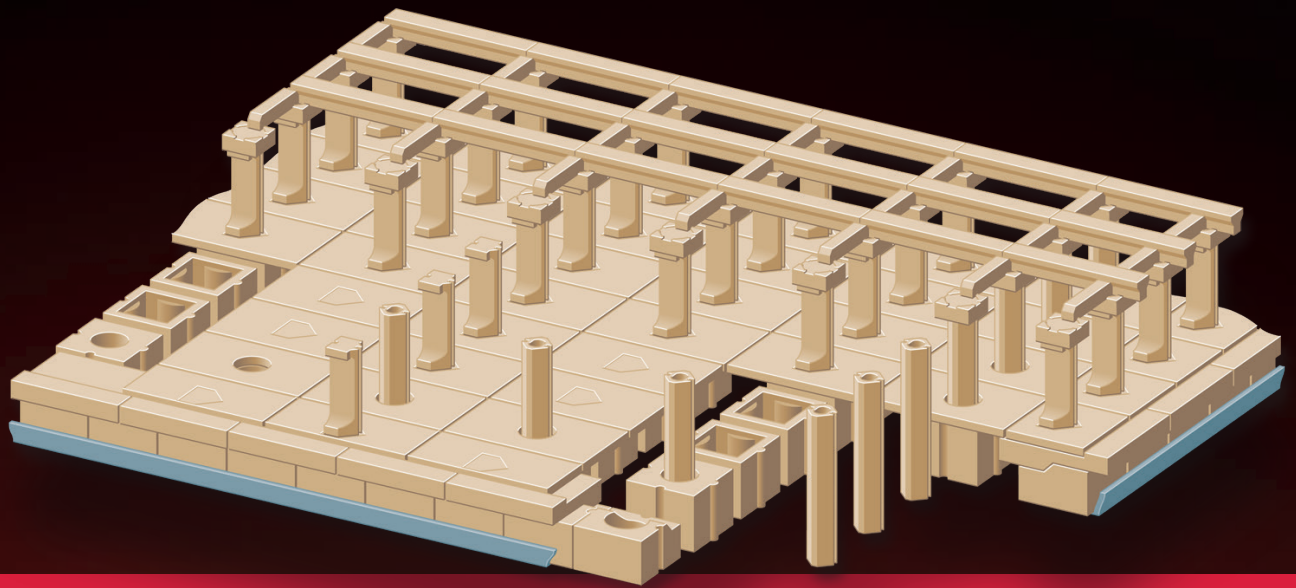


Above: Sintered rings – Unground and ground sintered rings serve as carriers for annular sintered parts such as synchroniser rings or gear wheels. If the sintered product requires very precise seating, rings can be ground to a flatness of 0.03 mm on both sides.

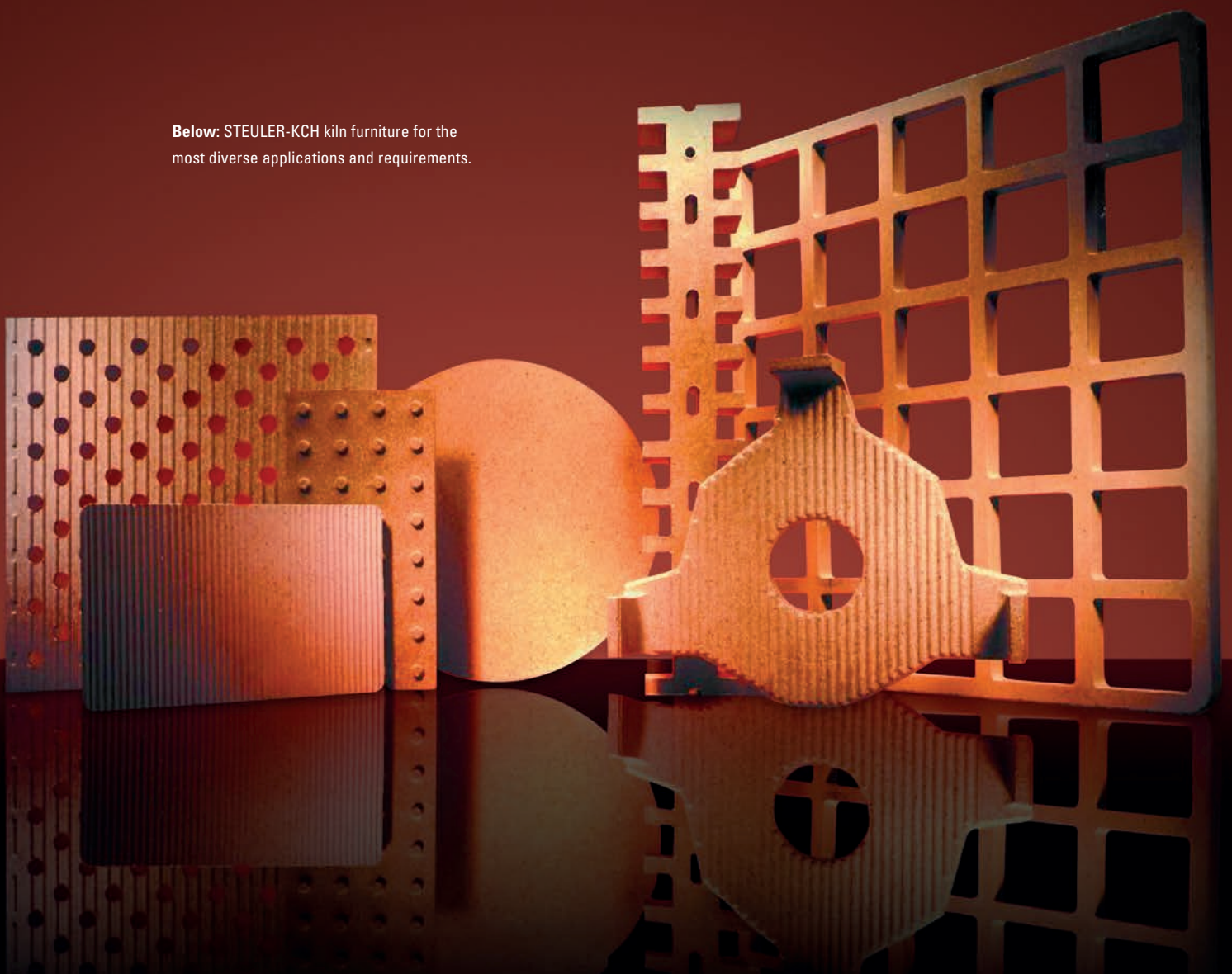
Ceramic industry

Constantly rising energy costs and frequently changing products in the ceramic industry necessitate versatile rack systems. Optimum use of the available firing space is a must. The variable kiln car system from STEULER-KCH offers the required flexibility and stability. This also makes STEULER-KCH kiln car systems well suited for use in applications such as automatic tunnel kilns, muffle kilns and shuttle kilns.

STEULER-KCH developed a special connecting system for severe mechanical loads, especially for "long hauls" in the tunnel kiln circuit. Stable kiln assemblies are installed without mortar, thereby ensuring trouble-free operation. Special anchor stub connections also compensate for thermal stresses during heat-up and cool-down phases.



Above: Extremely robust but light kiln car setting system with special props.



Below: STEULER-KCH kiln furniture for the most diverse applications and requirements.



STEULER KCH

Alphaplast S.A.
Spain

CIMA S.r.l.
Italy

Ditescor S.A. de C.V.
Mexico

**Shanghai STEULER-KCH
Anticorrosion Engineering
Co. Ltd.**
China

**STEULER-KCH Australia
Pty. Ltd.**
Australia

STEULER-KCH Austria GmbH
Austria

STEULER-KCH France S.A.R.L.
France

STEULER-KCH GmbH / Jordan LLC
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STEULER-KCH Maroc S.A.R.L.
Morocco

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New Caledonia

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Spain

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Spain



Together with its international subsidiaries and representatives, STEULER-KCH offers its customers a worldwide network which develops and implements comprehensive system solutions.



SURFACE PROTECTION

Lining and flooring systems
Cements, jointing materials,
brick and rubber linings



PLASTICS ENGINEERING

Equipment, piping and tanks made of
duroplastics and thermoplastics
Thermoplastic lining systems



REFRACTORY SYSTEMS

High temperature refractory linings



POOL CONSTRUCTION

STEULER-Q²-System



Siershahn site



Höhr-Grenzhausen site

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