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The strongest of links

Employing around 100 dedicated staff, represented in more than 50 countries and exporting to over 80, HEKO Ketten GmbH has been investing heavily in its production facilities, maintaining its strong market position. Paul Brown of *Global Cement Magazine* met HEKO's Alexander Koch and Dirk Schmidt at a recent tour of the company's Wickede plant in the Ruhr area of Germany.

Above: Hardened chain appearance after heat treatment – an aesthetically pleasing sight.

Right: In the early days - Round steel chains being forged by hand.

Below: Aerial view of HEKO's kiln chain production facility in Fröndenberg, Germany.

Bottom: Aerial view of HEKO's manufacturing plant in Wickede (Ruhr), Germany.

History and markets

HEKO, a worldwide synonym for quality and service, has been producing round steel chains and accessories for bulk material conveyors in Wickede since 1917. That year Hermann Koch established the company Kettenwerk Hermann Koch in Wickede (Ruhr).

Round steel chains were forged by hand, initially by just eight employees. Following construction of new workshops, subsequent extensions and technological updates, founder and owner Hermann Koch passed away on 7 July 1955 Franz-Josef Koch then took over the running of the company.

In 1967 the workshop was extended to 6000m² and its Golden Jubilee was celebrated by its 130 employees. Within three years chain wheel production started at HEKO and in 1978 the company name was changed from Hermann Koch KG to Kettenwerk Wickede-Ruhr GmbH. Over the 14 years which followed, new technical offices were built, including a laboratory to accommodate a wide range of testing equipment.

Capacity expansion with new welding machines for chains up to 42mm in diameter and extension of the hardening shop took place in 1990 along with the acquisition of CNC controlled machining facilities for chain wheel manufacture. Franz-Josef Koch passed away 16 July 1992, at which stage Alexander Koch entered the company as managing director in what was the 75th anniversary of the company.

For many decades now the company has been one of the

leading manufacturers worldwide of case hardened chains for bucket elevators and chain conveyors, the case hardening process resulting in a hard, wear-resistant chain surface.

Since 2004 HEKO has also been market leader in the field of heat-resistant kiln chains, having acquired the kiln chain producer Fröndenberger Kettenfabrik Heinrich Prünfte (itself having been established as early as 1887). These two production facilities in Germany combine to make 39,000m² of floor space. Since 1996 HEKO has been certified according to DIN EN ISO 9001 and DIN EN ISO 14001, the latter for environmental protection.

Running an export office in Baden Württemberg, southern Germany and in China since 2005, the company is represented in more than 50 countries and has clients in over 80 countries in the cement industry, coal power stations, incineration plants, the paper industry, artificial fertilizer plants, food and chemical industries and the general machinery sector.

Investment in technology

Since 1917 investments have been made in various generations of heat treatment technology. In 1939 HEKO GmbH was already carburising chains via kiln-annealing equipment. As a result of regular investment in modern equipment and the continuous qualification of its personnel, the company is able to offer a very high level of know-how.

The ALD ModulTherm system installed in 2007 - the year of the company's 90th anniversary - is said to represent technological leadership within the field of low pressure carburising. Flexible qualities of the ModulTherm system permit a quick exchange between different charges. The fully-automated vacuum furnaces place the company in a position today of being able to offer its advanced case hardening technology



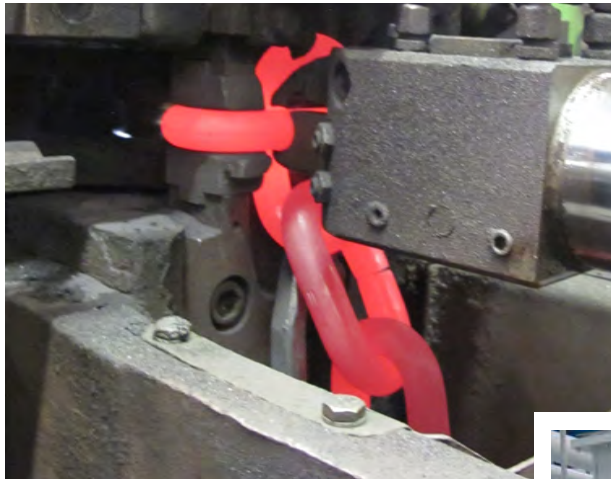


not just to its demanding, loyal customers in various industrial sectors but also to other manufacturers of high wear-resistant components.

Giving *Global Cement* a tour around the company's Wicked facility, Dirk Schmidt, responsible for international sales, explained that the application was new for ALD at the time but that it functions extremely well, particularly with a consistent product. 'Dry' quench hardening is performed to a depth of 2.6mm on average.

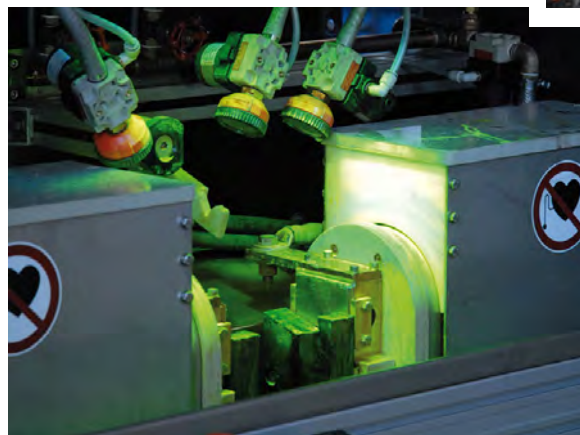
The technology installed is reportedly unique in the manufacturing of chains. 1000kg can be heat-treated in one furnace at a time, assuring the greatest possible accuracy for the longest of chain segments. The benefits of the ModulTherm system are:

- Constant measurements and minimum distortion in heat treatment,
- Superior full hardening and toughness with homogeneous material through rare-gas-quenching in cold chambers,
- Time-saving procedures by quick reheating and cool-down of charges,
- High precision in heat treatment and different stages of procedure,
- Clean and non-polluting heat treatment,
- Few personnel required for the computer-controlled system.



"This technological advance gives a matt finish to the chains which initially was also new for customers but they were advised well in advance and the overall reaction was most positive. In actual fact we had more of a need to explain if the same customer received chains from our conventional chamber furnace!" said Dirk.

"Apart from the required hardness profile, important additional improvements such as in dimensional accuracy, combined with an immaculate finish have also been accomplished. This constant quality also reduces the potential for uneven chain wear," Dirk continued.



Above left: Raw material.

Both standard steels are delivered as lime-coated round material. Lime coating prevents premature corrosion of the material and simplifies handling while in the machines.

Above centre: The quencher control panel.

Above right: Charging the inert gas quencher – up to 1000kg can be handled in one furnace at a time.

Left: The bending process.

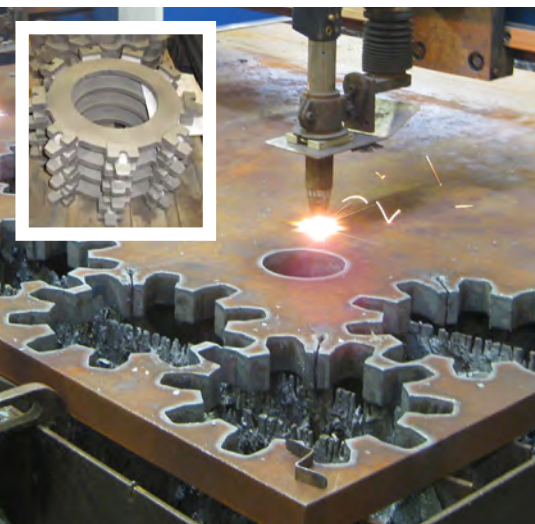
Bottom left: Induction surface hardening of elevator attachments.

Bottom right: A freshly welded chain link.

Below: HEKO has invested in a ModulTherm vacuum furnace system. The system keeps HEKO ahead of its competition.



Above: Chain links are tested for dimension in the most modern sensor-controlled machines and, if need be, their tolerance range is extended. Their perfect sprocket fit is checked at this point before the chain reaches the hardening stage.



Above centre: Flame cutting, welding, grinding and machining in HEKO's two German manufacturing plants. Rare solutions and individual spare parts are manufactured for customers worldwide. Finished sprockets are shown (inset).

Above: Into the flame – elevator attachments prior to heat treatment.

Quality control

“HEKO prides itself on the systematic quality control of its products as this is the only way to achieve customer satisfaction with regard to quality and price,” explains Alexander Koch, managing director at HEKO. “Checking the incoming raw material, having a modern manufacturing facility at our disposal, intermediate inspection and continual final inspection prior to dispatch, these are all pre-requisites for maintaining a high quality product,” continued Alexander.

Heat treatment of chains, shackles and accessories is controlled by electronic processors. With case hardening the relevant carburising depth or respective case hardening depth are fed into a processor. The processor creates, monitors and controls the required atmosphere in the furnace. This ensures consistent, repeatable results. Details of the heat treatment parameters are printed out for every charge for records and traceability purposes. Each consignment is inspected to ensure compliance with the relevant DIN, works standard or instructions.

Results from the sensitive chain and shackle tests are printed out in diagram form. After testing on an automatic hardness tester, all details are printed out on a test report which also shows the hardening profile between the chain surface and core.

Scope of production

The production range encompasses round steel chains, bucket and scraper attachments, chain wheels, buckets and shafts as well as complete return and tensioning units for bucket elevators and chain conveyors as well as heat resistant ring kiln chains for rotary kilns.

Alexander Koch says his company is always interested in developing and optimising solutions in cooperation with its customers in order to find the most economic bulk material conveying system for them.

Chains

Computerised welding machines, including hot bending machines for chain diameters up to 43mm wire diameter, form part of the list of chain manufacturing equipment installed. For the greatest of accuracy, individual length correction is performed prior to heat treatment. The chain links are checked for dimensions in the most modern sensor-controlled machines and, if need be, their tolerance range is extended. A perfect chain/sprocket fit is confirmed at this point before the chain reaches the hardening stage.

Round link chains boast high fatigue strength and are manufactured from a wide range of materials including manganese steels, chrome-nickel steels and

fine-grain chrome-nickel alloy steels. They can be case hardened to a range of qualities according to client specifications. All chains are precisely calibrated. Tight production tolerances ensure perfect matching of components while greatest possible longevity is assured thanks to an optimal combination of heat treatment and breaking load. The chains are highly wear resistant with a minimum surface hardness of 800HV.

Chain wheels and sprockets

Flame cutting, welding, grinding and machining are all performed in HEKO's two German manufacturing plants in Wickede (Ruhr) and Fröndenber.

Especially rare, tailored solutions and their related individual spare parts are manufactured for customers worldwide. Attachments and wheels are completely tempered, resulting in very high breaking loads up to 1000-1200N/mm² and the chain contact faces are induction hardened.

Hardening and tempering generate a structure with optimised mechanical qualities for the specific application. As an example of a chain wheel, an excellent service life is claimed for the GTA pocket teeth chain wheels. The toothed rims are manufactured from special alloy steel. Chain contact surfaces are machined and sides are chamfered to ensure good contact with the chain and a good lead into the wheel.

Type GTA chain wheels are supplied for use with special attachments - vertical shackles according to DIN or TS shackles and lift-in scraper bars. Replaceable rims have the advantage that the hub can be left in place during refurbishment, also saving time and cost. Replacement costs are reportedly also favourable compared to completely new wheels. Dimensions for existing installations are tailored to suit the application.

Chain bucket elevators and elevator buckets

Elevator buckets are available in standard versions or custom made, with back wall reinforcing strips (type L), reinforcing back wall plate (type M) or sidewall reinforcing strips (type N). High capacity buckets increase the throughput considerably with minimal changes to the elevator footprint.

For handling compacted material or large stones, adding ripping teeth to the front of 5-10% of the buckets is recommended in order to reduce scooping forces and to minimise the risk of the tension device lifting and thus prevent loose chains and chain slip. Stiffeners inside the buckets are recommended for bucket width ≥ 800mm.

Bucket elevator attachments

HEKO offers a wide spectrum of attachments for elevators. These attachments are suitable for double-strand elevators. Heat treatment of attachments is performed individually to clients' requirements. A selection can be made from a range of various qualities.

The TS-L bucket elevator distance plate, for example, offers optimum support by attaching buckets spanning three chain pitches. Extremely smooth op-

eration is achieved featuring a higher breaking load and contact surface combined with lower wear owing to reduced surface pressure. These characteristics make it ideal for high turning moments, deep buckets, large-dimensioned lumps and compacting products.

As an example, chain shackles type TS / TS-N / TS-L are suitable as bucket attachments for all duties. The shackles are tempered and induction hardened in the contact areas to a hardening depth of at least $0.14 \times d$.

Shackle types TS and TS-N can be used with pocket teeth, projecting teeth and toothless chain wheels. Assembly and dismounting of the shackle is possible at any time when using spring pins for the fastening of the closing plates - split pins are available as an option. Type TS chain shackle is recommended for use as a horizontal attachment, i.e. mainly buckets with sidewall attachments. The forged distance plate incorporates an additional support on the chain wheel. Both toothed and toothless wheels can be used with the TS shackle.

Pre-assembled return and tensioning units

These units are available for new and existing elevators of bucket width ranging from 160 to 1600mm. Minimal maintenance is necessary thanks to automatic self-tensioning and maintenance free bearings and no dust emission is possible thanks to internal bearings.



The return and tensioning unit is completely encased inside the elevator boot, preventing dust emission.

The shaft is supported by maintenance-free dry bearings, the latter manufactured from alloy steel. These return and tensioning units are designed for easy access to replace worn parts, thus minimising downtime.

Kiln chain systems

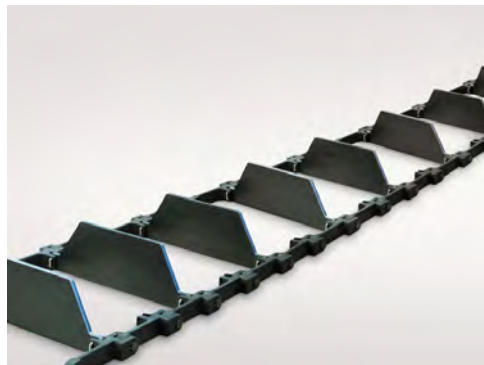
Rotary kiln chains are mainly used in the cement industry in wet process kilns as well as in long dry kilns. Moreover, kiln chains are used in the aluminium



industry and in lime kiln installations in the pulp and paper industry.

A properly designed chain system has to exchange heat, transport material, clean the kiln shell, reduce dust emissions and destroy mud rings. Kiln chains can be fastened inside the kiln as straight curtain chains, spiral chains or garland chains.

The company offers its expertise in the design of kiln chain systems to reduce energy costs and increase kiln outputs. Optimum kiln performance can be achieved with a well-designed kiln chain system, says HEKO. As an example, ring kiln chains are mainly manufactured in diameters of between 16 and 32mm, sometimes with larger end rings for an extended lifespan. Compared with oval type chains, round rings offer the advantage of self-cleaning of the rings and an even wear pattern for longest lifespans. They also achieve a larger surface area per unit length. The chains are manufactured from mild steel and stainless steels depending on the rotary kiln requirements.



The future

Parallel to its traditional round link chain range HEKO is also strongly developing its central bushed conveyor chain and forged link chain range. Complete catalogues are available for these single and twin strand conveyor solutions. The company is looking forward to its centenary celebrations in five years' time and can proudly look back at a company history characterised by continuously striving to achieve the best - through hard work and investment in technological innovation - accompanied by well-deserved success.



Above left: World map showing HEKO's network of agents and representatives in 50 countries.

Above: A central chain bucket elevator.

Below: Chain for a central chain bucket elevator.



Above left: Return and tensioning unit for chain bucket elevators.

Above Centre: Double-strand forged link chain for inclined conveying.