

Recycling experts since 1922



Horn & Co.

Steel Services



Horn & Co.

Minerals Recovery



Horn & Co.

Analytics

Horn & Co.

Group



Sophisticated solutions
and years of experience.



Horn & Co.

Group

Steel
Services

Minerals
Recovery

Analytics



"The experienced service provider for service, quality and the environment in steel-generating, refractory and other manufacturing industries".



Figure: Slag processing in Stegen 1970

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So that everything interlinks - economically and ecologically



The *Horn & Co. Group* is active in the fields of processing, disposal, analytics and sales. The objective of the Group is to realise a closed material cycle and the maximum possible recycling of raw materials. The eight individual companies form one entity and work with clockwork precision – closely interlinked, logically built upon one another and coordinated down to the last detail.

Our modern and successful management system utilises the technical know-how and the existing synergies of this strong group of companies.

The overview on the right clarifies the linkage of the individual companies.

Horn & Co. Group – Recycling experts since 1922.

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Group

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Steel Services

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Eisen- & Stein-
Gesellschaft mbH

Horn & Co.

Mineralmahlwerk
Westerwald

Horn GmbH & Co. KG

Rhebinol GmbH

Hochfeuerfeste Materialien

Horn & Co.
Polska Sp. z o.o.

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Luxembourg

SARL

Mireco

SARL

Minerals & Metals
Recovering

Mireco AB

HuK

Umweltlabor GmbH

**Competent Partner
of the Steel Industry.**



Horn & Co.

Steel Services

Since 1922 Eisen- & Stein-Gesellschaft mbH, part of the *Horn & Co. Steel Services* division, is your competent partner in the field of services for the steel industry. Due to our tight in-situ integration into the processes, we see ourselves as service partner for handling, processing, waste disposal, and reutilization of all arising residual solid matters. Steel Services permit the customer to concentrate on his core competences. You may feel free to entrust us all preceding and follow-up steps of work.



"Horn & Co. Steel Services are your reliable and strong service partner for production and logistic processes in steel mills."



Figure: Steel mill chain loader in Clean-Pit action

Moreover, on demand we offer further services, such as cleaning of industrial equipment and transport routes. With pleasure we also provide maintenance work of our experienced workshop service on machines and equipment. If you want, we perform tests of your mobile technical inventory in accordance with the German "Unfallverhütungsvorschriften" (Accident Prevention Rules). Our staff and machinery resources on the spot are kept at the ready for flexible service in favour of our customers. This is ideal for building projects, cleaning work, or if breakdowns occur, for example.

Close contact with customers permits us to develop tailor-made and pragmatic solutions. Equipment adapted to the processes given, an experienced staff, and innovative concepts based on many years' experience are our answer to the challenges of dynamic markets.

Performance review of Horn & Co. Steel Services:

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Steel Services - Slag Management



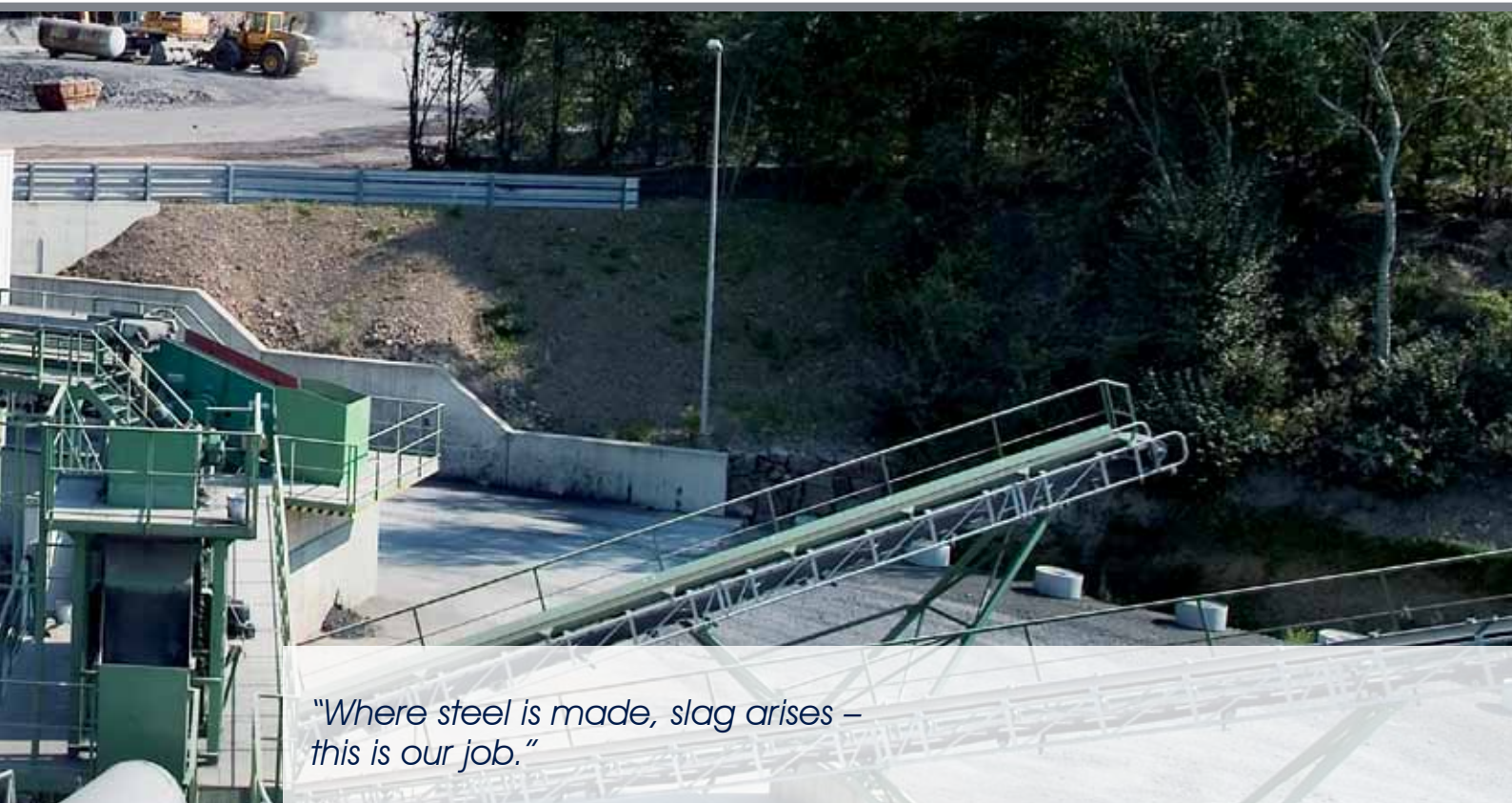
Figure: Slag processing at Siegen today

The term “slag management” comprises the whole processing route of steel-mill slag, from clearing the hot slag away via transportation and processing down to final utilization or waste removal. Concept and implementation of the slag management are adapted to customers’ specific demands and local conditions.



Horn & Co.

Steel Services



*"Where steel is made, slag arises –
this is our job."*

After tapping, in accordance with the furnace working cycle the still hot slag is loaded on special vehicles, which are designed to stand the high thermal and mechanical stress in these areas, in particular. This is accomplished by our self-developed special Clean-Pit Method. Thereafter the slag is carried away from the steel mill.

Modern equipment permits to divide the cooled slag into metallic and mineral components and process it to by-products. The metallic components can be separated from the steel-mill slag by magnetic systems.

Then the mixture is subject to manual sorting in order to separate non-magnetic, metallic, and diverse other fractions from the slag. If a slag cannot be classified as by-product, we care for its removal in connection with an adequate waste disposal treatment, as required.

Steel Services - Scrap Management



Figure: Scrap transshipment at Siegen

As service provider in the scrap management sector we accomplish all process steps preceding the melting process as far as charge scrap is concerned. Efficient transshipment devices guarantee a reliable inventory management and consignment sale system for the materials. Our trained staff performs the in-situ incoming tests of the raw materials as per the specification set by the melting company.





The know-how: Scrap Management – for more benefit and efficiency

The scrap is classified in the mill by mobile analytic X-ray fluorescence devices in accordance with the customer classes given.

Depending on customer's analytic demands and the product quality designed, more extensive analytical tests provided by the prepared know-how of the *Horn & Co. Analytics* team are possible.

Just-in-time performance to transport the raw materials from the dumping ground to the melting unit by means of special vehicles is available. To ensure an optimized course of the process, we crush the metal to usable sizes by flame cutting or in our skull cracker.

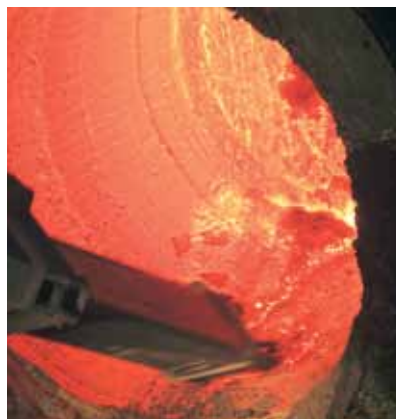
By their coordinated scrap management *Horn & Co. Steel Services* guarantee continuous supply to the melting unit.

Steel Services - Break-Out from Metallurgical Vessels



Figure: Telescopic excavator in action

To achieve an efficient melting process, it is necessary to smoothly interlock preceding and follow-up processes. Breaking-out from metallurgical vessels is a follow-up process, which should be carried out by a trained staff in order to minimize downtime caused by failure.





A hot issue: Breaking-out requires training

Modern special vehicles, such as telescopic excavators, permit our team to fast and conscientiously perform break-out operations while the process is running. So a new lining can be applied without problems.

The broken-out materials can be presorted already in the customer's facilities. Coordinated handling from the place of origin down to application of the exactly sorted components is the base for best reutilization of broken-out refractories.

The specific know-how for the utilization of refractory waste is always available from the *Horn & Co. Minerals Recovery* staff.

Steel Services - In-House Logistics



Figure: Special dumper for in-company transport applications

Within the framework of slag and scrap management as the two core competences, there are multiple synergies with the customer's in-house logistics.

With a fleet of special vehicles adapted to the internal applications we offer the ideal solution for the transport of your goods. Our rich experience comprises the transportation of slag and scrap, semi-



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Continuous processes by talent for organization

finished and finished products, loose bulk and other materials, which must be moved within a steel mill. Our fleet comprises, i. a., tractors for heavy-haul trailers and other tractors, skip handlers and roll-off tippers of trucks, dumpers, but also many special vehicles.

Based on many years' experience, *Horn & Co. Steel Services* use the logistic systems of customers, integrating them into the transportation services offered. Coordination and scheduling of the transportation orders are based on close cooperation with the customer and a well thought-out fleet management system.

Steel Services - Industrial Cleaning



Figure: Suction vessel in action

For *Horn & Co. Steel Services* the term "industrial cleaning" means general cleaning work within a steel mill. To ensure long life and mechanical functionality of your equipment and the accompanying infrastructural components, regular professional cleaning is recommended. On demand our team will be ready to remove impurities from the equipment by means of an industrial suction vehicle and additional special devices.



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Special performances for general service

Our service comprises, i. a., cleaning of cranes, waste-air exhaustion systems, furnaces and secondary metallurgical units, especially in hard accessible areas, too.

Concept and organization of the cleaning work can be adapted to the particular course of processes and to the operating cycles of the units concerned. This will mean that our performances are as far as possible coordinated with the particular product line planning and maintenance work of each mill, in order to avoid additional break-downs. Keeping adequate resources for cleaning work and optimized logistics at the ready, we are able to provide flexible access to our services for the customers.

Creative and Professional Recycling of Refractories / Ceramic Materials

Horn & Co.

Minerals Recovery

Mineralmahlwerk Westerwald Horn GmbH & Co. KG, who were founded in 1956, have been the origin and base of the *Minerals Recovery* division.

Thanks to our Europe-wide presence and due to the certification as a specialized waste disposal company, in Europe we have become a trustworthy partner for lasting and legally safe work in this field.



"Horn & Co. Minerals Recovery provide an economical and legally safe utilization of residual ceramic materials in the refractory and steel industries."

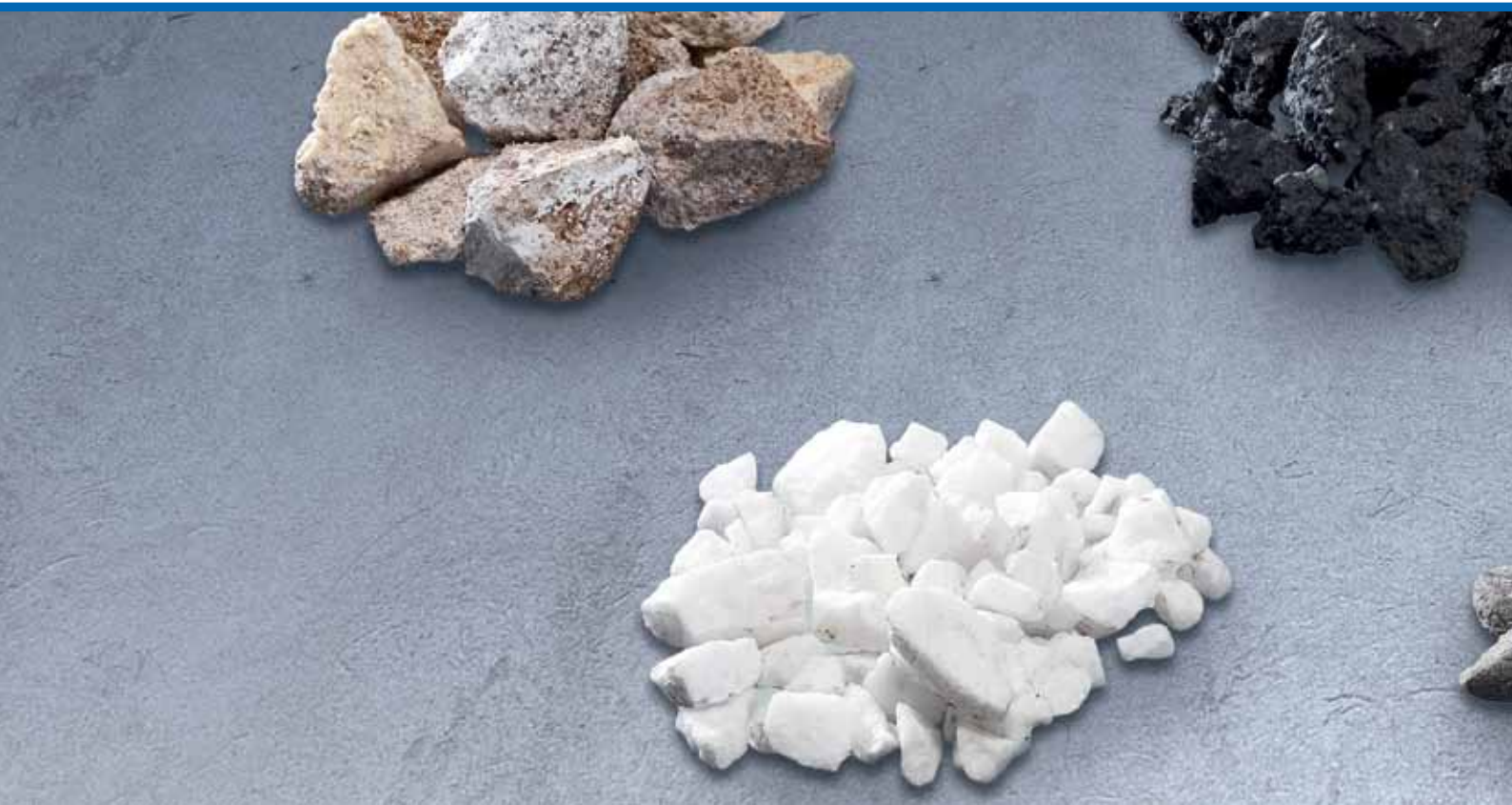


Production of regenerated materials, most of them based on residual refractories, which are obtained in the steel, glass, non-iron metal, lime, cement, and chemical industries, is a central component of our product portfolio. We are authorized and capable to take over refractory / ceramic residual materials / waste and distribute them – after processing - as products. The “regenerates” produced replace or replenish many raw materials that are used in the refractory industry or in metallurgy. These partly quite contrary demands require expert competence and experience with regard to the raw materials used, e. g. if the chemical or mineralogical composition and properties or the behaviour at certain temperatures are concerned. Therefore a high-qualified team of engineers, i. a. from the ceramic, metallurgical, mineralogical, and chemical sectors, offers multiple options how to use regenerated raw materials and avoid the expensive removal by dump disposal.

Performance review of Horn & Co. Minerals Recovery:

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Minerals Recovery - Regenerated Refractories



A core process in our production of regenerated raw materials consists in classifying of break-out materials. High-qualified and experienced employees provide manual sorting on several locations, partly on the points of origin. Where human senses do not work exactly enough in manual sorting, an innovative laser system analyzes material quality.





*Making new products from used ones –
consistent reworking and reutilization as raw materials*

Our costly quality assurance system, which after each manufacturing step checks if the product conforms to the specification agreed, is of no less importance. It is clear that our demanding and mostly long-standing customers assume a high degree of quality consistency and adequate availability before a recipe will be changed in order to use a regenerated material. It is a central part of our philosophy to meet these demands - as well as our efforts to build long-term and persistent partnerships, which provide planning reliability for both parties.

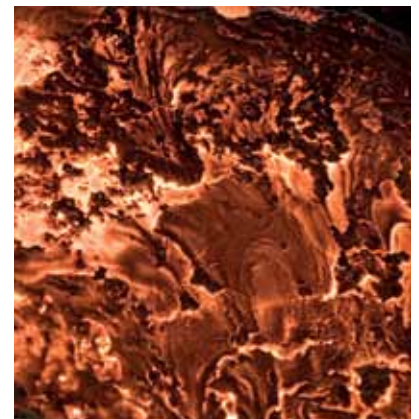
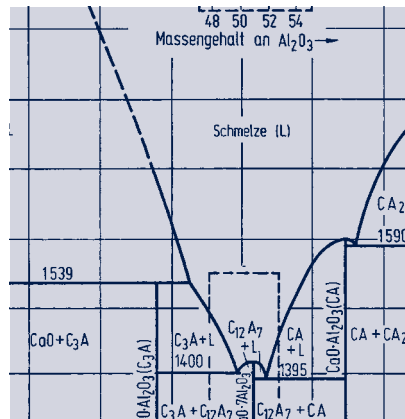
The customer himself determines the desired degree of manufacturing penetration. Most of the properly classified and cleaned materials can be broken and ground to smaller fractions and the common granulation standards by jaw, cone, or plain-roll crushers, impact mills, and screening plants. Our drying plant also permits drying of the grains down to a residual humidity < 0.3 %. Depending on customer's desire and in accordance with quality and purpose, we pack the products into big bags, paper, or PE bags or send the goods in a silo truck.

Minerals Recovery - Our Metallurgical Agents



No matter if it is about slag formation / liquefaction, influencing the slag composition, or insulation and covering: We work out innovative and tailor-made solutions for the demands of the pig-iron and steel manufacturing processes.

After careful reworking, used refractories, alone or combined with customary primary raw materials, are





Unconventional and innovative: Our metallurgical agents

the base for a wide range of alternatives to traditional metallurgical agents and their possible disadvantages.

Together with the consumers and based on the experience and creativity of our staff, the products are designed with regard to sufficient availability as well as to a homogeneous composition, which matches a quality level as required. Customers' multiple demands for a thrifty and low-cost use as well as the issues of slag utilization and its environmental compatibility have to be considered here.

The customer has multiple options among granulation, humidity, and packaging of these products as well.

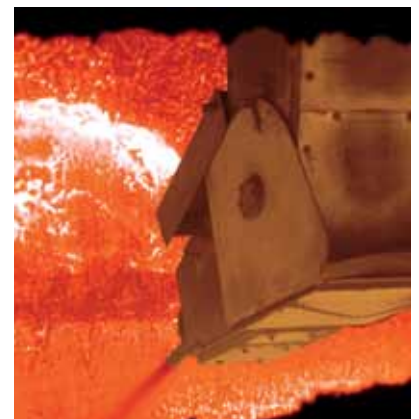
The demands for large quantities that are often made in this sector can be matched thanks to our whole-European network of origin points and by our endeavour to permanently develop new sources of raw materials.

Minerals Recovery - Unshaped Refractories



The product portfolio of the whole *Horn & Co. Group* is perfectly rounded off by our offer of unshaped refractories.

Depending on the raw materials base, the manufacture of our unshaped refractories is implemented in two plants on separate production lines. Processing comprises commercial magnesia and alumina types,





At First: Dialogue

as well as specially reworked grains from basic and alumina-containing regenerated materials. Our products are designed in close cooperation with the given user. This relates to grading and the binding system, for example.

Use and portion of alumina-containing and basic regenerated materials in our products essentially depend on the given profile of demands, being agreed with our customers in each particular case. Thus, our product range comprises high-value bodies based on tabular alumina, bauxite, and sintered magnesia, but also their variants partly or fully produced with alternative raw materials.

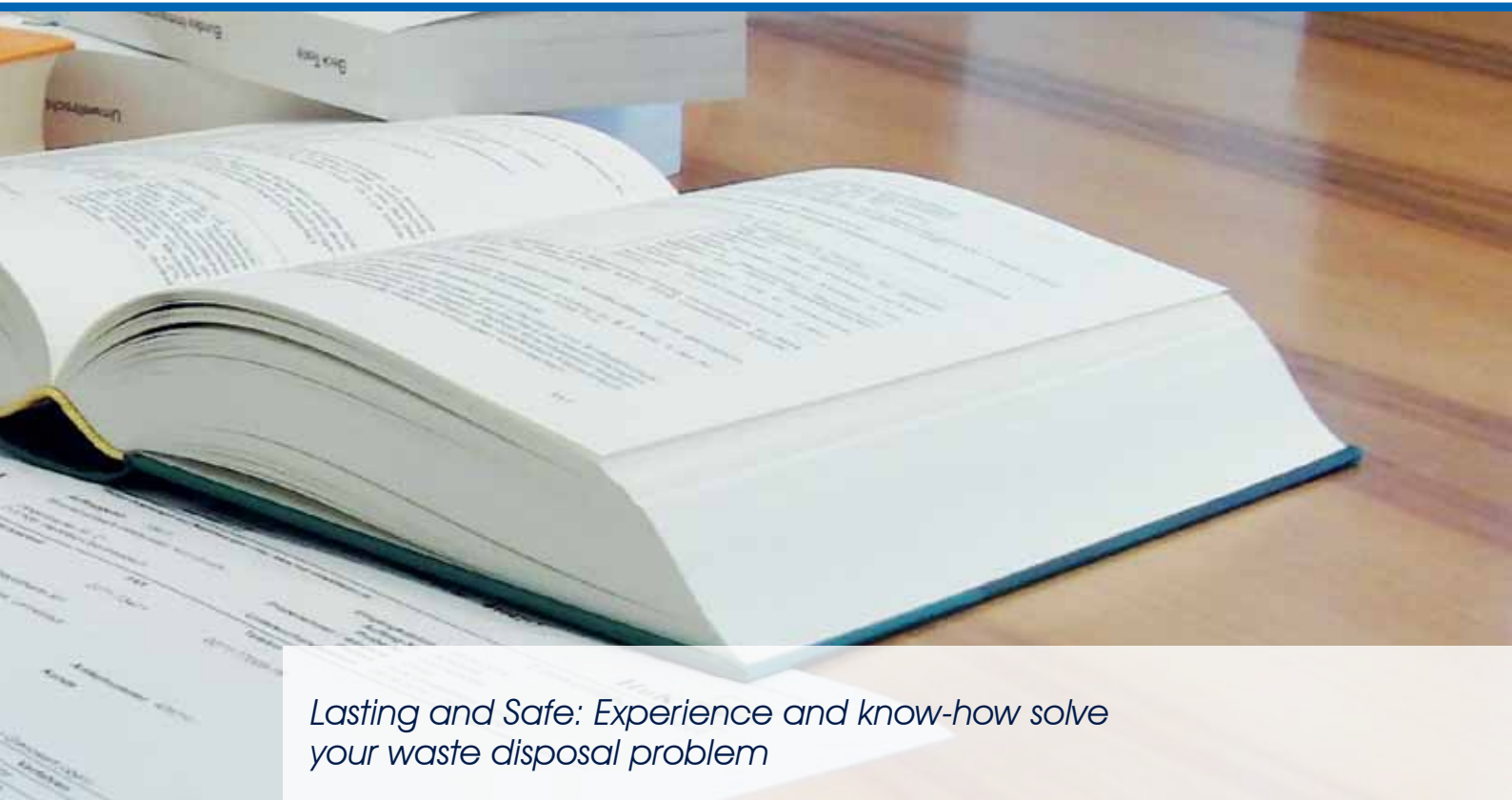
So, flexibility and optimization of the product in favour of the customer are ensured to a high degree.

Minerals Recovery - Advice and Waste Disposal



Indeed, the more and more complex lining concepts for aggregates in high-temperature processes guarantee users of refractories a stable and safe process control, however they complicate a proper waste disposal after use. No matter which kinds of residual refractories are obtained on your plants: Our experts will stand by you for all questions around the waste disposal topic. If desired, we will provide expert's opinions on the materials and take samples from them on the spot. Together with you and based on a





Lasting and Safe: Experience and know-how solve your waste disposal problem

chemical analysis, we can plan the waste disposal route.

On the base of our long-standing experience in the refractories recycling sector we can offer integral waste disposal concepts. In this context, the latest valid legal bases, such as the German law "Kreislaufwirtschaftsgesetz" (Recycling Economy Law), are of crucial importance. As a specialist waste disposal company, we provide the prerequisites required for taking-over refractory waste from most diverse sources, for its proper treatment, and for delivering the reworked material as a product to our customers. It is always our goal to rework each material with a maximum recycling quota, in accordance with its properties, and return it to suitable applications within the material working cycle.

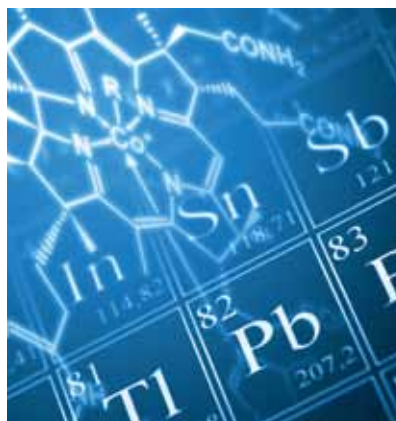
We can show you alternative applications of your refractory waste types or give advice in your considerations on how to substitute primary raw materials by regenerated ones.

Technology which goes one step
beyond the boundaries.

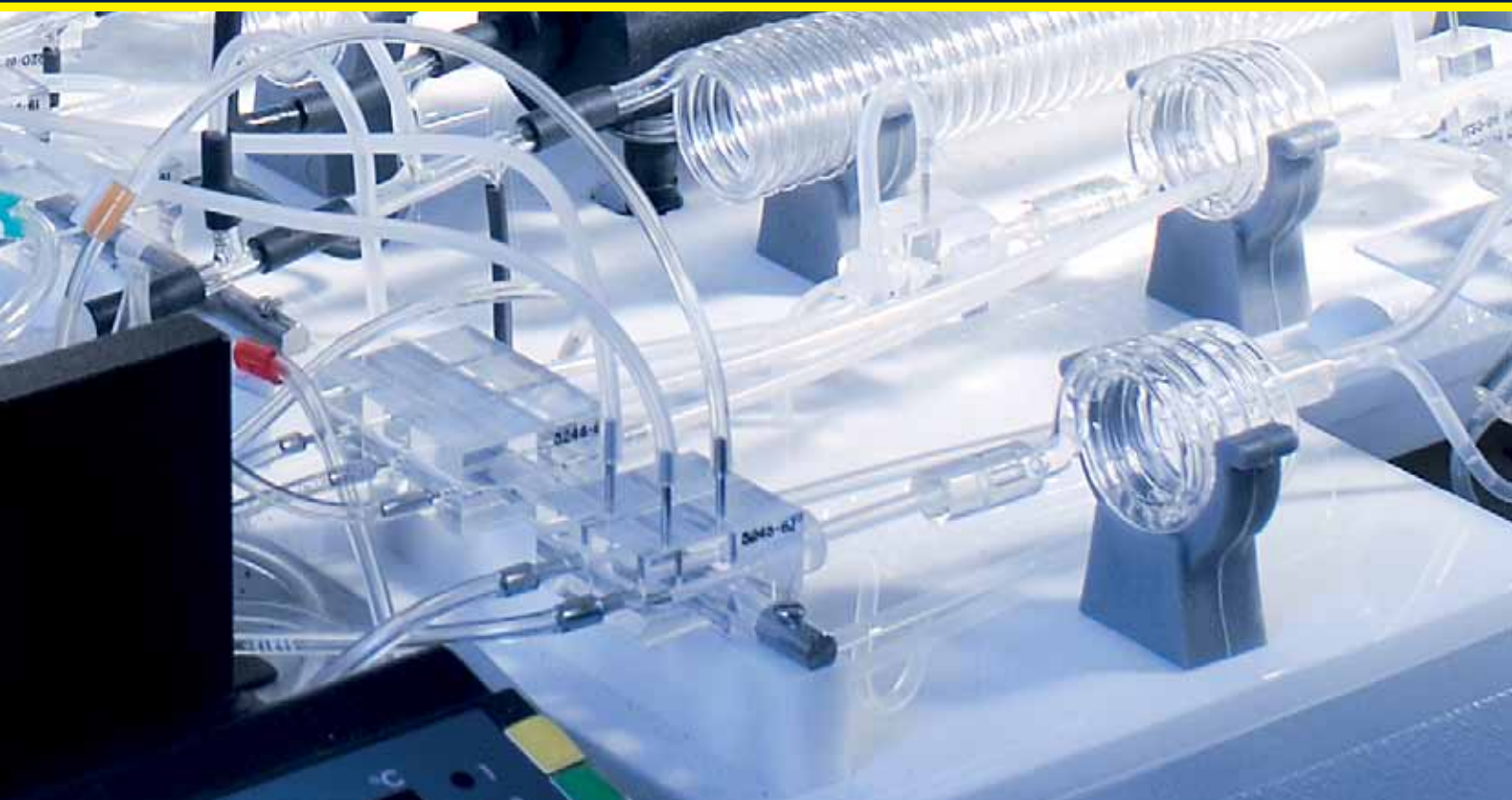
Horn & Co.

Analytics

The HuK Umweltlabor was founded as a neutral, independent and accredited test laboratory in 1994. Ever since, it has stood for precision, flexibility and speed in the field of analytical problem solutions. Here we orientate ourselves to the needs of our customers and the current requirements. Our team has comprehensive experience in the fields of materials, environment and hygiene. In addition to pure analytics, however, our service and consultancy work is extremely important to us.



"Horn & Co. Analytics supply analyses and advice for quality and for the future".



The extensive specialist knowledge of our experts in all areas and a functioning network within the Horn & Co. Group provides an optimum basis for appropriate solutions and a comprehensive service regarding waste avoidance, recovery and the development and improvement of your products. Synergies or interaction with colleagues from *Horn & Co. Steel Services* and *Minerals Recovery* supplement our performance portfolio.

Performance overview of Horn & Co. Analytics:

Service and consultation	30 - 31
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Material	36 - 37

Analytics - Service and consultancy



Our service is intended to relieve the strain on our customers. We supply the best possible service performance by providing our customers with a complete package, which, besides analysis, includes pre-consultancy as well as interdisciplinary concluding evaluations. The quality of sampling as well as the corresponding preparation contributes decisively towards the analysis results. Our trained and certified personnel carry out correct sampling and expertly prepare all samples. In connection with this, the quality of all work processes is ensured through comprehensive certification.





Trust is good – control is better

- **Sampling**

(Drinking) water, alloys, refractory materials, waste, etc.

- **Sample preparation**

- **Expert reports**

- **Product control & development**

- **Quality assurance**

Accredited according to DIN EN ISO / IEC 17025 Notification according to BBodSchV and AbfKlärV

Investigating body according to §25 State Waste Act of North Rhine-Westphalia

EKVO laboratory according to §10 no. 4 EKVO

Drinking water investigation body according to TrinkwV

Analytics - Hygiene



The HuK Umweltlabor GmbH is listed as a drinking water inspection office for microbiological and chemical examinations in accordance with the German Drinking Water Ordinance (Trinkwasserverordnung). The modern laboratory equipment as well as experienced and qualified personnel ensure a broad spectrum of examinations. Besides classic (drinking) water examinations, further hygienic, microbiological and chemical examinations are offered which reflect the entire analysis spectrum of *Horn & Co. Analytics*.





Analyses for pure safety

Water

- Drinking water
- Untreated water
- Swimming and bathing pool water
- Cooling water

Microbiology

- Contact examinations
- Air conditioning systems
- Sterilisation checks

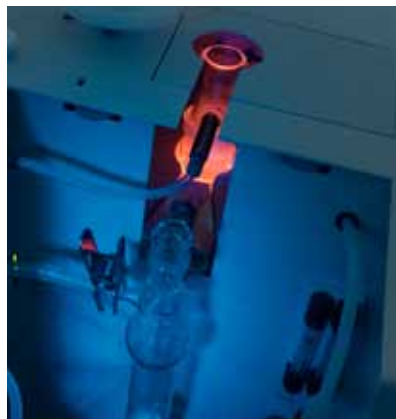
Indoor air

- Workplace measurement
- Indoor air

Analytics - Environment



Problem solutions and answers to various questions with a view to our environment are essential and can be quickly, reliably and cost-effectively answered through examinations conducted by our qualified laboratory staff. With environmental-analytical examinations, we provide a basis in order to answer questions, to ensure quality, to accompany renovations, to control operational processes and therefore to protect staff and deployed capital. The state of the art equipment in our laboratory also provides a high standard of (quality) reliability. We analyse the following for a better environment:





Effects on people and the environment

- **Solids**

- Soil
- Construction waste
- Sludges
- Waste
- Recycling products

- **Water**

- Waste water
- Cooling water
- Ground water
- Flowing and surface water

- **Standard analyses**

- LAGA, DepV, BBodSchV
- AbfKlärV, AltholzV, RCL
- Concrete-corrosive potential (Betonaggressivität), etc.

Analytics - Material



The requirements on various materials and raw materials as well as pre, intermediate, by- and end-products are increasing in view of globalisation, pricing politics as well as increasing demands on specified characteristics. We stand for the development of optimum solutions in the field of most diverse tasks in production, quality assurance, raw material checks, research and development. We are able to examine the following typical materials:





Product safety through analysis diversity

- **Oxides**

- Refractory materials
- Slags
- Glass and ceramics

- **Metals**

- Steels
- Alloys
- Scrap metal
- Special materials
- Waste and recyclable materials

- **Fuels**

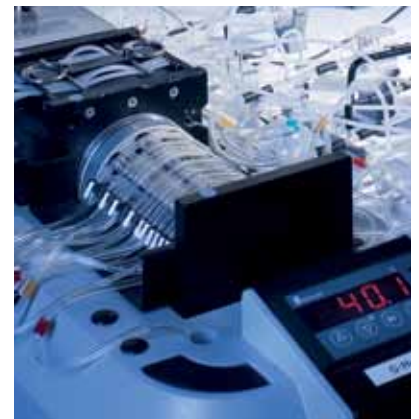
- Paints, multi-component systems
- Fuels (organic / secondary / oils)
- Organometallic compositions

A closed cycle - For the sake of the environment.



Since 1922, the *Horn & Co. Group* has set itself the objective of developing concepts and processes in order to optimally process the waste occurring in industry and to return this to the material and economic cycles.

In view of the importance of energy saving, conservation of resources and sustainability, a responsible company must be involved in this matter.





Long-term solutions and trusting partnerships are our objective

In particular in raw material and energy-intensive fields of industry, requirements and possibilities exist for realising economic and ecological optimisations.

In view of the national emergence of approx. 40 million tonnes of various mineral waste from thermal processes per year (Source: Statistisches Bundesamt: Umwelt-Abfallbilanz 2010 - Federal Office for Statistics: Environmental waste balance 2010), it becomes apparent that solutions have to be found which enable these quantities to be processed optimally, to relieve the landfill space, and to support the affected companies in safeguarding their sites.

The *Horn & Co. Group* is able to fulfill this task using the collective experience contained in their three divisions, *Steel Services*, *Minerals Recovery* und *Analytics*.

Horn & Co.

Steel Services

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Minerals Recovery

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Analytics

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