

## EXPERTS FOR INDUSTRIAL WEAR PROTECTION





General Management  
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“Kalenborn provides impressive, reliable solutions for protection against wear. For nearly 100 years now, we have been offering high-quality, durable products. From the development and production of our materials to customer support and design to installation: with us, everything is available from a single source.”

**CONTENTS**

Editorial .....	p. 2-3
Production process .....	p. 4-7
Values .....	p. 10-11
International .....	p. 12-13
Employees .....	p. 14-15
History .....	p. 16-19
Wear-resistant materials .....	p. 22-23
Wear-resistant pipe systems .....	p. 24-25
Wear protection for industrial plants and equipment .....	p. 26-27
Customer-specific solutions .....	p. 28-29
Facts and Figures .....	p. 30-31



**WE COMBINE DEDICATION WITH EXPERIENCE**

Kalenborn is the internationally leading provider of wear protection solutions. Our company has a rich tradition characterised by competence and experience as well as durable, quality products. We protect industrial plants and equipment reliably against wear due to abrasion and impact. In steelworks and cement plants, in coal-fired power plants and recycling plants, in mining and in environmental technology, our solutions keep production operations running.

We rely on a high-quality range of mineral, ceramic and metallic materials as well as compounds and plastics. That variety enables us to create lining systems which are perfectly matched to each specific application. Working closely together with our customers is particularly important to us. In close collaboration, we develop concepts for sustainable solutions and then realise them – both in our own works and on-site at the facilities of the customer.



# EFFECTIVE WEAR PROTECTION IN A COMPLETE PACKAGE

From the development of our materials to the lining of pipes, plants and equipment, we offer a complete range of products and services, all from a single source. In so doing, the quality and durability of our products stand above all else. As experts, we begin with the production of our materials. We know the raw materials and the manufacturing processes. That comprehensive expertise enables us to ensure the quality characteristics of our products at all times.

“Kalenborn develops and produces all materials in-house. That’s how we ensure the quality of our comprehensive material portfolio.”



## **MINERAL** FROM NATURAL BASALT TO FUSED CAST BASALT

In the early 1920s, Kalenborn’s fused cast basalt works successfully produced a wear-resistant material made of basalt for the first time ever – a material now known the world over under the brand name ABRESIST. Today modern furnaces, in which the rock is smelted at 1,250 °C, are the heart of the production operations. The liquid basalt is cast in moulds and subsequently heat treated in a special process in order to give the material its crystalline structure. That makes the rock especially hard and strong. Along with very good protection against wear, ABRESIST also provides an anti-friction surface.

## **CERAMIC** FROM MINERAL TO CERAMICS

KALOCER is a high-alumina ceramic compressed in a mould and fired at high temperatures. It is suitable for applications subject to extreme wear and temperatures of up to 1,000 °C. KALCOR zirconium corundum is particularly well-suited for use in castings. In the form of plates, mosaics, moulded parts and hollow cylinders, our ceramic materials are installed in a wide range of plant components such as pipelines, cyclones, sifters and chutes. This ensures the reliable production of energy, raw materials and other important products we all use in our everyday life.

## **METALLIC** FROM SCRAP TO HARD METAL

For especially harsh operating conditions, we have developed special hard casting alloys – such as KALCAST, for example. Alloy components such as chromium and carbon ensure especially high hardness and abrasion resistance, whilst manganese provides impact strength. In our foundry, we produce cylinders, pipe bends and moulded parts weighing from 30 to 3,000 kg. Our KALMETALL material, from which we manufacture components which can weigh as much as several tons, consists of steel plates armoured with special hard metal alloys. It exceeds the service life of common steel several times over.

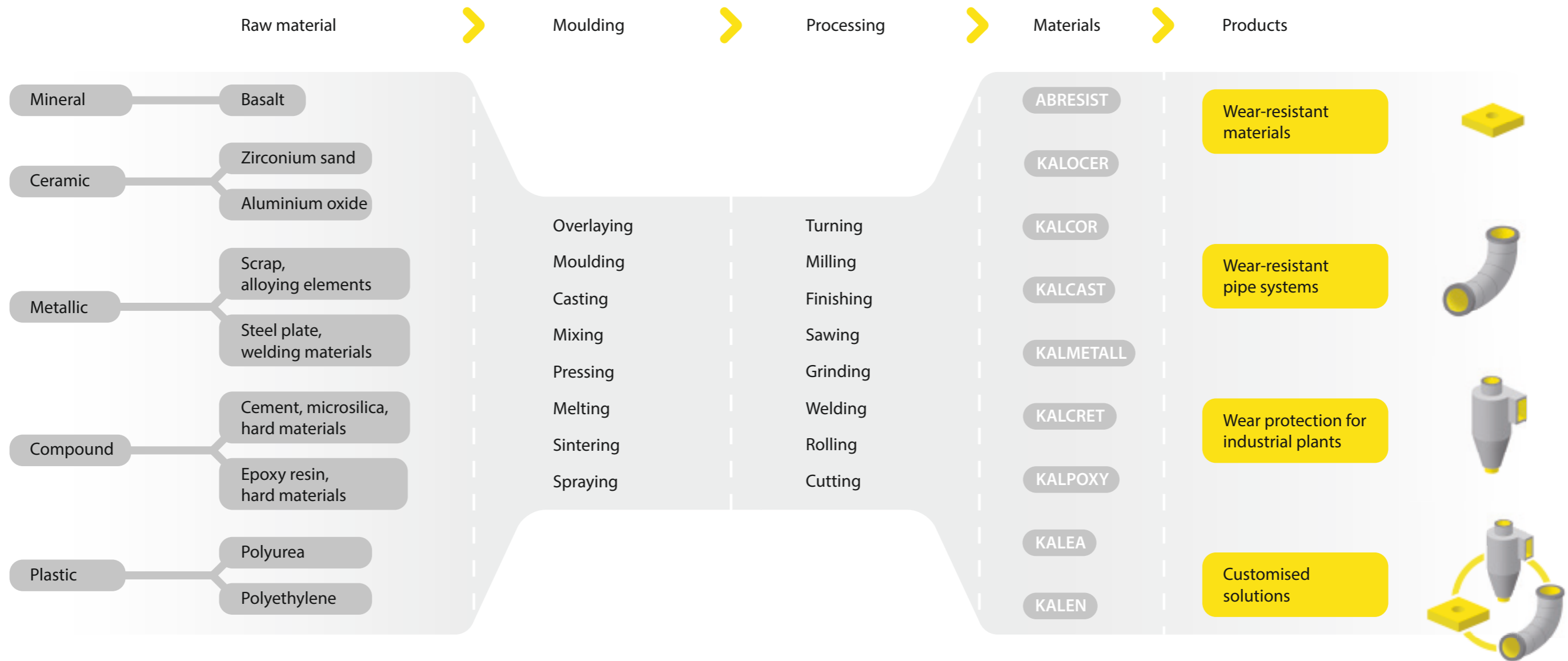
## **COMPOUND** FROM HARD MATERIAL TO COMPOUND

Our hard compounds combine excellent wear protection properties with ease of use. KALCRET has especially wear-resistant hard materials such as bauxite or corundum permanently embedded in it. Its special advantage lies in its versatility. Our employees apply the material with a trowel or spray it on to create an extremely wide variety of precise components. KALPOXY is an epoxy resin-bonded compound, which can be used quickly and effectively in the seamless lining of plant and equipment components and for repairs. The material can be used in chemically aggressive environments.

## **PLASTIC** FROM POLYMER TO ENGINEERING PLASTIC

Plates made from thermoplastic form the basis of our material KALEN. They offer corrosion-free, anti-friction wear protection in bunkers, silos, chutes and troughs. With its especially low weight and an operating temperature of up to 80 °C, KALEN has proven effective all over the world for decades. It is installed on concrete or steel by means of a mounting system, which we developed specifically for the purpose. KALEA is a high-performance thermoset and is applied extremely rapidly in a thin, seamless layer by means of Kalenborn spray technology. The material features outstanding wear resistance under very high impact loading and an operating temperature of up to 120 °C.

## THE PROCESS WE USE TO MANUFACTURE OUR PRODUCTS



## UNCOMPROMISING QUALITY

We are mindful of the need to continuously optimise our materials' properties and manufacturing processes, and thereby their product quality. A certified quality assurance system specifies detailed requirements for all process steps and control points in production operations. In our in-house test labs, our employees carry out material testing

such as microstructural studies and wear tests according to international standards. In addition, other special procedures are used to determine material hardnesses. Long-term wear resistance testing is carried out in the laboratory under various operating conditions.

Material testing in the in-house laboratory ensures the product quality of the materials and the durability of the lined pipe systems and plant components.



“The better matched the material and the lining are to a given problem, the longer the service life and the more cost-effective the solution.”





A customised solution to protect against wear: Kalenborn experts line a filter housing with the ceramic material KALOCER for a steelworks.

## WE THINK FURTHER IN ALL DIRECTIONS

Thanks to our materials expertise and decades of application experience, Kalenborn's long-lasting wear protection solutions and services enjoy an outstanding reputation the world over. We take over responsibility for the satisfaction of our customers. Our orientation is based on the central core values of on-site service, expertise and sustainability.

### ON-SITE SERVICE

Kalenborn is well-known throughout Germany and beyond for its high reliability. With 12 subsidiaries and over 20 distributors, we guarantee direct and personal contact to our customers – worldwide. Moreover, our own broad range of products also makes us extraordinarily capable of adapting to different customer demands. The decisive benefits: individual on-site customer support and products tailored to the specific requirements of the application.

### EXPERTISE

Every plant is different. The operating conditions, the material being conveyed, and the economic objectives of our customers are factors that we take into account in designing the right conceptual solution. Our many years

of experience in an extremely wide range of wear protection areas and our broad material portfolio help us succeed.

Our range of services covers the entire process: we determine the suitable materials, develop the mounting concept and carry out the installation – for permanent, high-quality wear protection solutions.

### SUSTAINABILITY

As a medium-sized, family-owned German company, we place value on self-financed, organic growth and a long-term perspective. This is also reflected in our products. Continuous quality assurance contributes to the high quality of the materials. With their long service life, our solutions promote process reliability, extend the service life of the equipment in the plants, and help to conserve our customers' resources.





## LOCAL PRESENCE WORLDWIDE

With roots in Germany's base material industry, Kalenborn has developed into a global company with international partnerships on five continents. Our broad material portfolio and our services such as consulting, engineering and installation are available to our customers worldwide.

### NUMBER 1 IN EUROPE

The countries of Europe are in a state of transition toward becoming ecologically and sustainably oriented industrial countries. Process reliability, extending the life of plants and equipment, and raising productivity form the core values of industry. That poses challenges for wear protection – and for Kalenborn. Europe is where we have our strongest presence, with our headquarters in Germany, our sales office in France, three manufacturing operations in Poland and one manufacturing operation in Hungary.

### LEADING EDGE IN THE AMERICAS

Heavy industry in the Americas runs continuously. Due to the geographic and geological situation, there is an extensive construction and mining industry. Kalenborn Abresist and Kalenborn Technologies in the USA and Kalen-

born Canada handle diverse queries from an extremely wide range of industrial sectors. Our subsidiary in Brazil covers the South American market.

### LEADING IN ASIA

Asia is investing intensively in infrastructure and mining. We are opening up new prospects there with our optimised materials, our know-how and our experience. Kalenborn is well-represented in Asia. Our companies in the Philippines and in Singapore react rapidly and flexibly to the continuously changing requirements of markets and customers. With new materials and storages facilities, we continue to pursue our expansion strategy.

### EXPANSION IN INDIA AND RUSSIA

We have already been supplying tonnes of ABRESIST and KALCRET to India for five decades now. Demand for energy and raw materials has increased dramatically in the wake of extremely rapid industrial development of the republic. A challenge for our distributors: it takes multifaceted solutions and personal commitment here. In Russia, industry is investing in longer plant service life. Our wear protection products are used here, too.

Networked know-how and local presence all over the world





# WITH PASSION FOR WEAR PROTECTION

Our production operations combine modern manufacturing technology with carefully executed craftsmanship. In our plants we operate modern machinery and production equipment. But only our employees, with their many years of experience and their skilled craftsmanship, can achieve the desired precision and attention to detail.

The employees at each of our plants are especially important to Kalenborn. Their skill, their experience and their sense of personal responsibility are key factors to our success. Our team is characterised by a high level of expertise, individual initiative and flexibility. We place a high value on enthusiasm for the task, passion for detail, and harmonious interaction. General manager Dr. Conrad Mauritz is convinced: "Our well-trained and passionate employees are the key to optimal product quality and excellent service."

"We work every day to improve the quality of our materials and to supply the best wear protection solutions for our customers."



We are there for you, the world over



## WEAR PROTECTION FOR THE FUTURE – WITH A LONGSTANDING TRADITION

### 1921 | ESTABLISHMENT

On 7th September, "Schmelzbasalt AG" is established in Linz am Rhein, Germany – the start of the industrial manufacture of fused cast basalt.

### 1929–1935 | CHANGE OF DIRECTION

The stock market crash of 1929 and the subsequent global economic crisis slow development. On 19th June 1935, under the leadership of Dr. Ing. Kurt Mauritz, new shareholders join together and drive industrial wear protection forward.

### 1937–1944 | DURING THE WAR

The company changes its name to "Schmelzbasaltwerk Kalenborn – Dr. Ing. Mauritz Kommanditgesellschaft". The armament industry consumes all iron and steel resources. In many areas, those materials are replaced by fused cast basalt.

### 1945 | END OF PRODUCTION

In March, the works comes under artillery fire during the Battle of Remagen. Production is shut down, repairs take one year. At great sacrifice and having endured considerable hardship, production successfully resumes in 1946.

### 1950–1959 | THE PATH TO EUROPE

Through the establishment of 15 distributors, sales are expanded to all Western European countries. At the end of the 1950s, exports represent 35% of turnover and production reaches the pre-war level.

### 1960–1969 | ON THE GLOBAL MARKET

In the 1960s, sales are expanded to the United States, India and Australia. Intensive research is conducted, not only into metallic and ceramic raw materials, but also into thermoplastics, and further developed by the 2nd generation with Dipl. Ing. Wouter Mauritz.





# WEAR PROTECTION FOR THE FUTURE – WITH A LONGSTANDING TRADITION

## 1977 | EXPANSION TO THE USA

With the establishment of Kalenborn Abresist Corporation in Indiana, a production operation is created for the American market.

## 1990–2010 | INTERNATIONALISATION

By extending the network to include subsidiaries in Canada, Brazil, Poland, France, Hungary, Singapore and the Philippines, in-house production operations are rounded out and the market presence is expanded. With Dr. Conrad Mauritz, the third generation takes over the leadership of the company.

## 2014 | KALENBORN AS AN INTERNATIONAL BRAND

The global corporate network bundles its services under the umbrella brand “Kalenborn” and communicates its worldwide claim as a market-leading, innovative and international turnkey provider of high-quality wear protection solutions.

## 2016 | EXPANSION OF RESEARCH AND DEVELOPMENT

Kalenborn expands its in-house research laboratories. In collaboration with recognised institutions and universities as well as with the support of government ministries, classic materials testing is carried out according to international standards.





“Today what began more than nine decades ago with fused cast basalt has become a broad spectrum of materials with extraordinary properties. Add to that the expertise and the experience that we have gained around the world in many industrial sectors.”





## WEAR-RESISTANT MATERIALS

We produce our wear-resistant materials in our own plants and ensure their quality through material testing in our laboratories in order to find just the right solution for each customer requirement. One of the prerequisites for effective wear protection is also a professional installation, which our employees carry out with special adhesives and fasteners.

ABRESIST fused cast basalt reliably prevents abrasive wear in plant components such as scale flumes, marl hoppers, fly ash pipelines in coal-fired power plants, and coke bunkers in the iron and steel industry. The cast ceramic material KALCOR has proven effective for lining plant components that are subject not only to extremely harsh abrasion, but also high temperatures, for example in chutes for hot sinter or clinker, in asphalt mixers and hot gas pipelines. KALOCER high-alumina ceramics are available in thin, smooth moulded elements and are particularly well-suited for lining conveyor belt transfer points, concrete mixers or cyclones in the food industry.

For the high impact wear typically found in components such as bunker inlets, spiral chutes and crushers, we recommend metallic materials such as the armoured plates made of KALMETALL and KALCAST hard casting. The hard compound KALCRET combines easy handling with excellent wear protection properties under high temperature loading. To line large surfaces – such as those of separators on a cement mill or of blast furnace dust catchers in an integrated steel mill – the material can be applied without joints using a trowel or sprayed on. Within 48 hours, the plant is ready for operation again.

Very different requirements arise under operating conditions which demand especially good anti-friction properties, e.g. in silos and bunkers. Such applications use not only KALEN, as a thermoplastic material with ideal anti-friction properties, but also the mineral material KALCERAM. They prevent the material which is being conveyed from building up, thereby ensuring uninterrupted material flow. For rapidly applying a thin, jointless coating to large surfaces or pipes, Kalenborn offers KALEA, a sprayable material with its own application technology.

Kalenborn has a full range of wear-resistant and anti-friction materials







## WEAR-RESISTANT PIPE SYSTEMS

Pipes, elbows or pipe fittings are lined with materials to make them wear-resistant. Hydraulic and pneumatic pipe systems often have to withstand extremely harsh conditions. Conveying abrasive materials such as ash, sand or sinter dust subjects pipelines to acute levels of stress. The right wear protection ensures the continuity of the production process.

To protect pipelines against wear, we have developed a standard that uses strong linings to extend the service life of the stressed components. The smooth surfaces of the materials promote good flow characteristics. This reduces pressure losses and lowers energy costs. In pneumatic pipelines, lining the most heavily stressed points, such as elbows, branches or transitions, is often enough to achieve the required protection.

Moreover, we offer an intelligent system for monitoring wear protection. It reports the end of the material's service life in advance and warns the operator early about the impending failure of a pipeline. That prevents environmental pollution and hazardous operating conditions.



Reliable protection for hydraulic and pneumatic conveyor lines

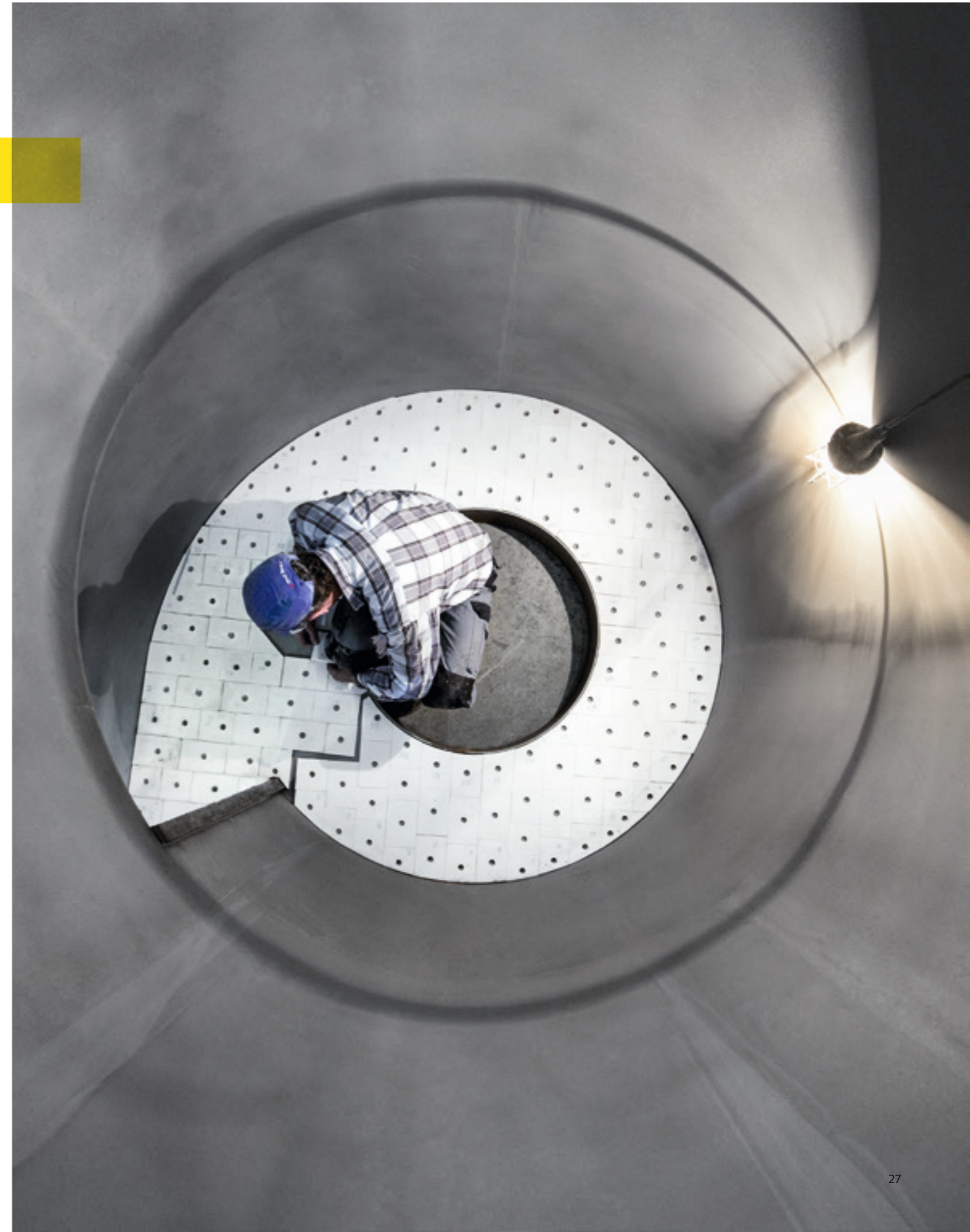


# WEAR PROTECTION FOR INDUSTRIAL PLANTS AND EQUIPMENT

No two wear problems are exactly alike. Determinant wear factors in industrial plants include the material throughput as well as grain size and shape. Stress loading also plays a major role: In continuously operated plant components such as cyclones, abrasive wear is most prevalent. Equipment used in batch operations, such as mixers, silos and chutes, must also withstand the loading and discharge process. Operating temperature is also a factor in the selection of the right wear protection material.

In order to develop the optimal wear protection system for a plant component, our experienced employees often recommend combining different materials. Those materials are then matched to the different loadings. The selection of a suitable means of installation is also important. Different parameters such as temperature, vibration or accessibility in the plant require different methods for mounting the wear protection elements.

Linings for long service life







## CUSTOMER-SPECIFIC SOLUTIONS

Our customer-specific solutions are innovative wear protection applications for complex industrial plants. These wear protection solutions take various factors into account along with the specific operating environment of our customers' plants.

We satisfy customer requirements for safe and economical production as well as longer equipment service life through the right selection, combination and mounting of materials. The key to the success of our solutions lies not only in analysing the actual conditions, but also in working together with our customers during the development process. Time and again, our expert knowledge is channelled into new developments for the steel industry, for coal-fired power plants, for mining and for environmental engineering.

Our solutions are used, for example, in petrochemistry, where oil and gas are extracted from shale. The plant crushes the wet stone and conveys it via belts to a flash dryer.

With an initial air temperature of 800 °C, the fine-grained oil shale is then blown upward at high speed through the riser into the adjacent cyclone. The geometry and process conditions change with every metre that the material rises.

In the hot area at the lower section, we install ceramic materials with very high resistance to hot abrasion and thermal shock. In the middle section, relatively moderate operating conditions prevail, which require a material with primarily good resistance against abrasive wear. And finally, in order to improve impact strength in the upper section at the turnaround, especially impact-resistant and massive components are installed.

This unique combination of materials, the special mounting systems, and the installation on-site demonstrate how Kalenborn works as a partner to meet special requirements. We ensure the long service life of plants and equipment and help to sustain the economical production of gas and oil.



A bucket wheel as an example of tailor-made KALMETALL welded construction



# AT A GLANCE

Further information: [www.kalenborn.com](http://www.kalenborn.com)

## LANGUAGES:

- German
- English
- French
- Italian
- Spanish
- Portuguese
- Polish
- Hungarian
- Russian
- Filipino
- Chinese



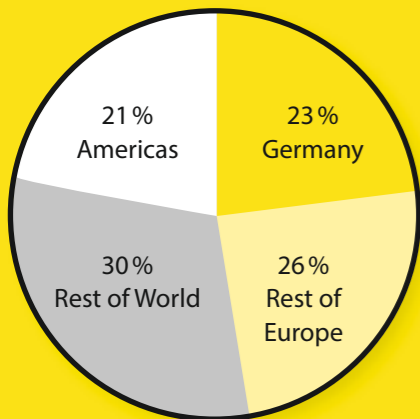
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EMPLOYEES  
WORLDWIDE

443	Production
70	Administration
68	Sales and Marketing
31	R&D, Technology, Engineering
15	Quality Management



## Markets



Quality Management according to ISO 9001 | Certificate as specialised welding firm according to DIN 3834-2 | Qualification as manufacturer and welding company for pressure equipment according to AD2000 information sheet HP0 | Qualification as manufacturer and welding company according to Pressure Equipment Directive DGRL97/23/EC annex 1, para. 3.1 | Installation firm according to SCC (Safety Certificate Contractors)

## Services

Piping

# 5,500,000 metres

Basalt production



Linings using materials



Active customers



## Industries



Power plants



Iron and steel



Cement



Mining



Environmental technology

