



# CONVEYING & STORING IN THE CEMENT INDUSTRY

## CONTENTS

4	AUMUND Group Equipment in the Cement Industry
6	Clinker Transport
10	Conveying of raw meal, cement and additives
12	Transport of raw material, clinker, additives and cement
14	Hopper discharge and crusher feeding
16	Proportional feeding, proportional discharge
17	Silo and hopper discharge
18	Dust-tight transport
21	Clinker loading
22	Unloading equipment
24	Clinker storage & Clinker discharge
26	Mobile bulk handling B&W Mechanical Handling
28	Stockyard technology SCHADE Lagertechnik
30	Conversions & Refurbishments
31	After-Sales Service



## CONCEPT AND ENGINEERING

The guideline for the AUMUND concept is maximum customer benefit.

- Adapted to the customer's specific requirements, all transport processes are constantly optimised on the basis of innovations and the latest technical know how.
- In order to combine economical and ecological aspects which will also comply with future demands, economical and at the same time ecologically balanced solutions are considered.

## MANUFACTURE AND ASSEMBLY

For the conveying and storage technology AUMUND offers a unique combination of:

- Highest technical standard
- System-solutions with reliably high grades of efficiency and profitability
- Central manufacture with intra-plant quality assuring systems
- Sophisticated assembly and start-up concepts under the instructions of highly qualified supervisors



Company Headquarters in Rheinberg

## The AUMUND Group

- High safety standards in all functions and under all conditions with worldwide proven technology, quality and reliability.

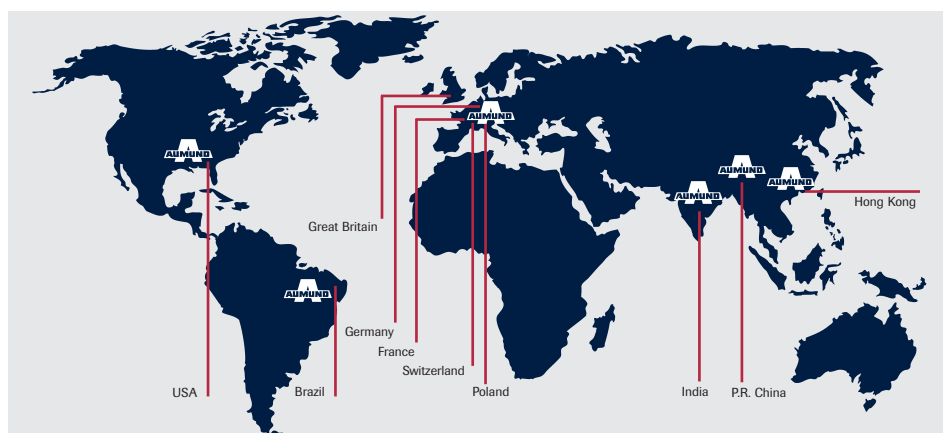
Worldwide the products of the AUMUND Group are being applied successfully in more than 10,000 plants.

The high standards AUMUND set themselves in the fields of concept, engineering, manufacture and assem-

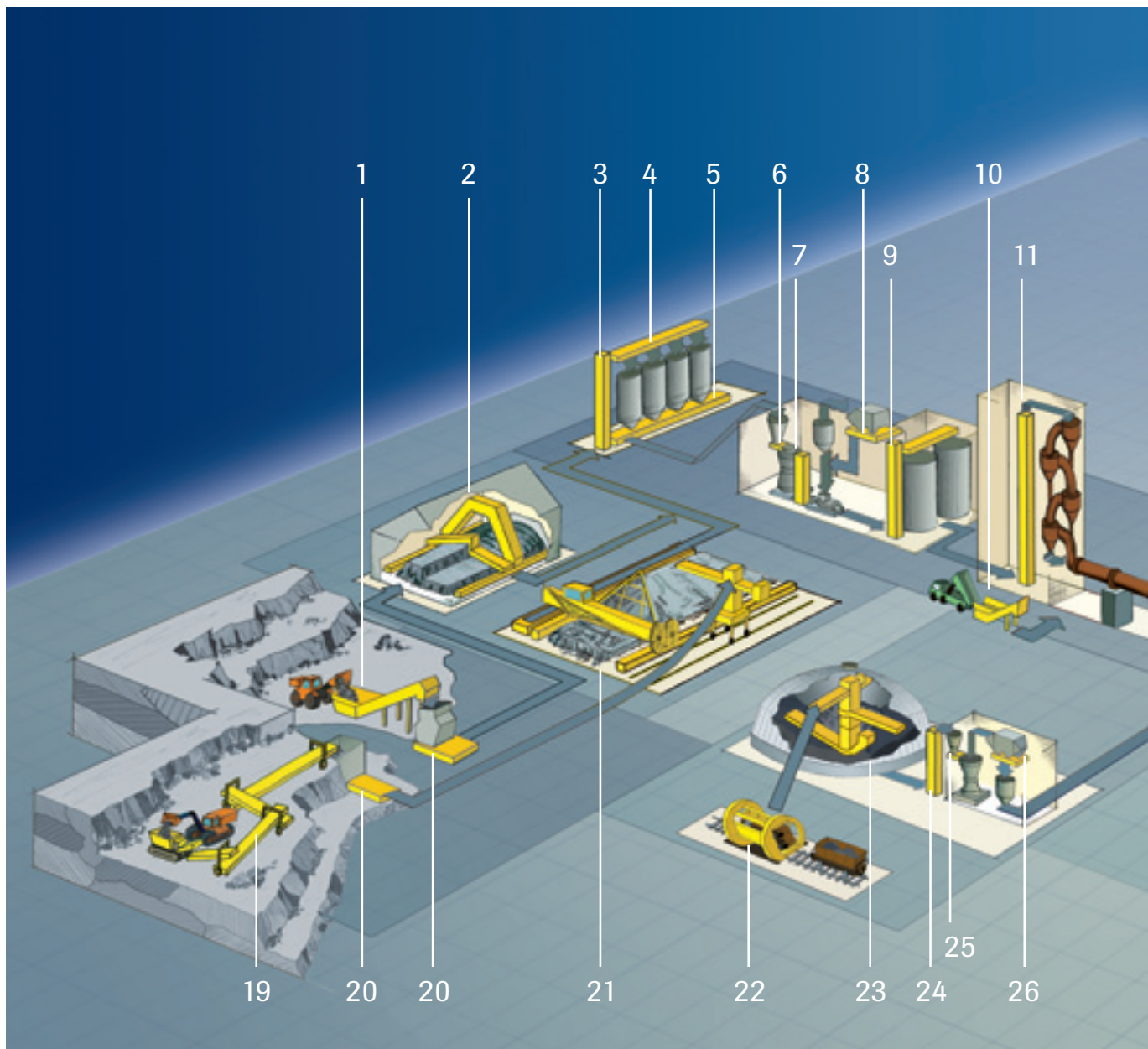
bly are supported by a network of worldwide offices and representations.

The products are manufactured in own facilities and locations of the Group.

- Certification according to DIN ISO 9001
- Patents and numerous references in more than 100 countries

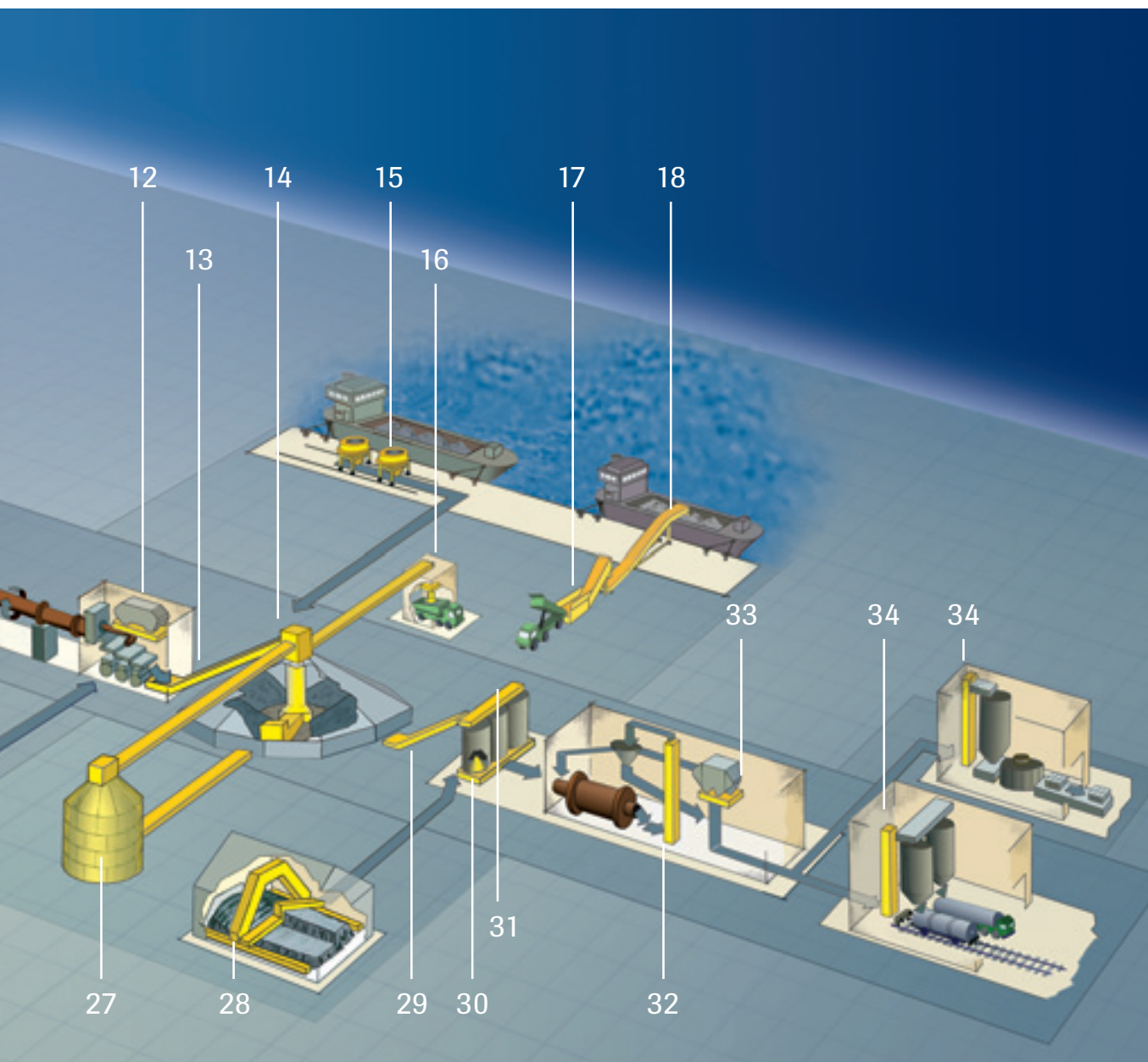






## AUMUND GROUP EQUIPMENT IN THE CEMENT INDUSTRY

- |  |   |   |
|--|---|---|
| 1. Limestone intake and transfer to stationary crusher | 6. Proportional feeding of raw mill             | 13. Clinker transport from cooler to storage  |
| 2. Storage and reclaim of shale/clay                   | 7. Raw mill circulation                         | 14. Automatic clinker discharge               |
| 3. Bucket elevator feeding pre-blending silos          | 8. Filter dust reclaim                          | 15. Grab unloading into de-dusted hopper      |
| 4. Distribution of limestone and aggregates            | 9. Raw meal silo feeding                        | 16. Truck loading of clinker                  |
| 5. Discharge and reclaim of limestone and aggregates   | 10. Reception and transfer of alternative fuels | 17. Clinker intake and transfer to shiploader |
|  | 11. Raw meal feeding to pre-heater              | 18. Clinker loading with mobile shiploader    |
|  | 12. Clinker dust reclaim                        |   |



- 19. Link conveyor with mobile face crusher
- 20. Limestone crusher reclaim
- 21. Limestone blending bed
- 22. Coal/petcoke unloading and reclaim
- 23. Storage and reclaim of coal/petcoke
- 24. Bucket elevator to coal mill
- 25. Proportional feeding of coal mill

- 26. Coal dust reclaim
- 27. Clinker storage in steel plate silo
- 28. Gypsum storage and reclaim
- 29. Clinker transfer to mill hoppers
- 30. Discharge and reclaim of clinker and additives
- 31. Distribution of clinker and additives

- 32. Cement mill feeding
- 33. Filter dust reclaim
- 34. Cement silo feeding





Deep-Drawn Pan Conveyors with transfer station

## CLINKER TRANSPORT

### DEEP-DRAWN PAN CONVEYOR TYPE KZB

When conveying hot, abrasive cement clinker, a trouble-free operation of the transport system is decisive for the availability of the whole system.

AUMUND Deep-Drawn Pan Conveyors type KZB, stand out for reliability and long service life.

KZB – the economic conveying system for the transport of cement clinker in 24-hour-operation – **quality assured and cost-effective, recognised and proven on all continents.**

- Inclination angles up to 28°
- Conveying heights of more than 60 m
- Capacities exceeding 1,000 t/h
- Segmented toothed rims
- Load-dependant chain program
- Available in reversible design
- Standardised components
- Patented plate sealing
- Plate widths from 400 to 3,000 mm
- Stiffened side plates
- Contact free overlapping of the plates
- Chain breaking loads of 290 to 1,900 kN/chain strand



Deep-Drawn Pan Conveyor for the silo discharge



Deep-Drawn Pan Conveyor type KZB



Silo feeding with steep-angle conveyor

## DEEP DRAWN PAN CONVEYOR WITH BAFFLES TYPE KZB-Q

- **Successful**
- **Economical**

Standard Deep-Drawn Pan Conveyors from AUMUND form the basic components of the steep-angle clinker conveyors, which are applied successfully and economically for inclination angles up to 40°.

The standard chain program

allows **conveying heights of more than 60 m** so that in case of a corresponding plant design clinker silos may be fed with only one conveyor.

- Inclination angle up to 40°
- Stabilised baffles
- Avoiding spillage by baffle recesses
- Capacity exceeding 750 t/h
- Temperatures up to 700° C



Deep-Drawn Pan Conveyor with baffles type KZB-Q



Deep-Drawn Pan Conveyor with baffles in the conveyor bridge





Feeding of steel plate silos

## BUCKET APRON CONVEYOR TYPE BZB

- Suitable for extreme inclinations
- Narrow bucket arrangement

AUMUND Bucket Apron Conveyors type BZB, have proven their suitability for extreme inclinations in cement plants. Unfavourable space conditions and **inclination angles up to 60° are regarded as preferred application conditions, especially in case**

**of conversions** in existing plants. The tight bucket arrangement is especially advantageous, where very fine-grained clinker with high dust content must be transported.

- Inclination angle up to 60°
- Conveying heights exceeding 60 m
- Smallest curve radius 10 m
- Standardised components
- Chain breaking loads
- up to 1,900 kN/chain strand

Bucket Apron Conveyor  
type BZB

Feeding of mill pre-hoppers





Distribution onto mill hoppers

## PIVOTING PAN CONVEYOR TYPE SPB

- **Efficient instrument of automation**

Important AUMUND developments have turned the Pivoting Pan Conveyor type SPB, into an efficient instrument of automation for the installation of economic transport systems.

If more than two silos are to be fed, the AUMUND Pivoting Pan Conveyor is the best solution.

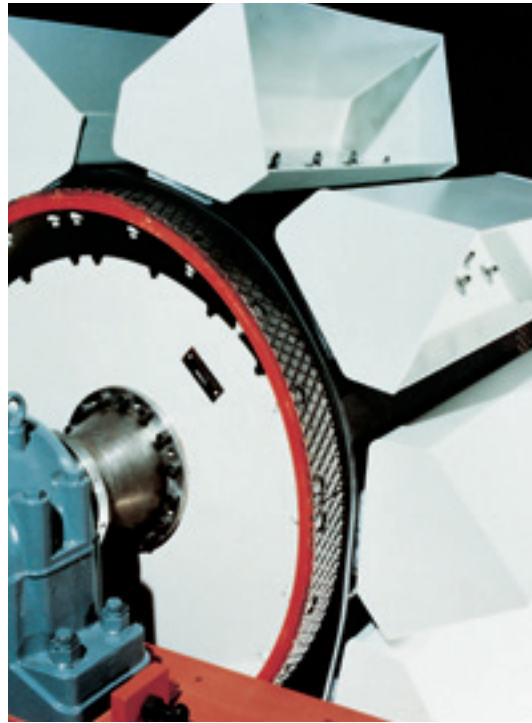
- Automated feeding of clinker silos and mill hoppers
- Remote-controlled
- Several intermediate discharges
- System length of 400 m and more realised
- Simultaneous conveying of different bulk materials in the upper and lower run
- Low maintenance requirement
- Minimum energy consumption
- Long service life



SPB with two intermediate discharge stations



Silo and heat exchanger feeding



Drive pulley



## CONVEYING OF RAW MEAL, CEMENT AND ADDITIVES

### BELT BUCKET ELEVATOR TYPE BW-G

- **Automatic parallel tensioning**

AUMUND Belt Bucket Elevators type BW-G, with automatic parallel tensioning device are applied for the conveying of cement, raw meal or other dusty additives.

**Lifting heights of 140 m** for the conveying of raw meal at heat exchanger towers or conveying capacities of **more than 1,500 t/h** here reflect the actual state of the art.

- Conveying heights of 140 m
- Conveying capacities of more than 1,500 t/h
- Continuous receipt and discharge of conveying material by means of tight bucket sequence
- Optimum discharge conditions
- Continuous operation with low-maintenance requirement
- Standard safety equipment: level control, off-track monitoring, speed monitor

As traction element **textile or steel reinforced belts** with

longitudinal and crosswise stabilizing steel cords are used depending on the load situation. AUMUND provides the **belt ends with special clamp-connections** consisting of aluminium profiles with spring-loaded screw connections. The rope ends of the steel reinforced belt are cast additionally with an artificial resin mass.

As a standard, the drive pulleys are equipped with exchangeable friction lining elements with diamond pattern, thus enabling





Heat exchanger feeding

the exchange of the segments without opening the belt. A parallel toothed rack guided tensioning device provides the automatic belt tension and prevents off-track running.

- Individual systems for different conveying materials
- Conveying material temperatures up to max. 130°C
- High tensile strength by means of steel cord fabric
- Creeping drive for maintenance purposes



Bucket Elevator for the conveying of raw meal



Transport of slag



Central Chain

## TRANSPORT OF RAW MATERIAL, CLINKER, ADDITIVES AND CEMENT

### BUCKET ELEVATOR WITH CENTRAL CHAIN TYPE BW-Z

- Reducing vibrations
- Preventing crack formation
- Long service life

High conveying capacities due to a tight bucket sequence and buckets up to 1,200 mm width are the characteristic features of the AUMUND Bucket Elevator type BW-Z, with forged central chain.

The bucket fixing which AUMUND realises by means of

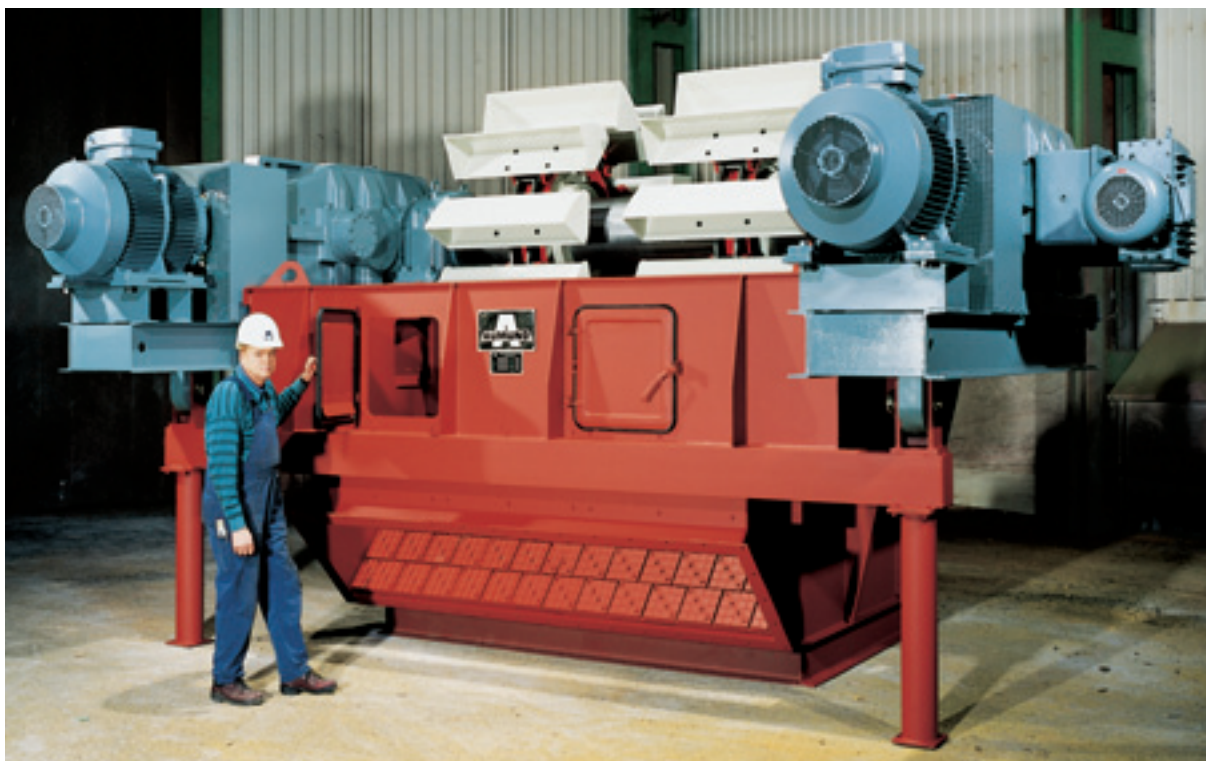
angular brackets with patented loose setting between chain bolts and angular brackets, reduces vibrations and thus prevents crack formation at bucket walls and welding seams.

The chain with lubricated labyrinth sealings contributes to long service lives.

- Conveying capacities of more than 600 t/h
- Conveying heights above 60 m

- Long service life – even in case of continuous operation
- Forged central chain with largely dimensioned joint surfaces
- Heat-resistant in continuous operation, shortly up to 400°C conveying material temperature
- Drive ring and tension chain wheel in segments
- Creeping drive for maintenance purposes
- Wide application range





Double Bucket Elevator for conveying capacities up to 1,500 t/h

## DOUBLE BUCKET ELEVATOR TYPE BW-D

- **Conveying capacities up to 1,500 t/h**
- **Capacity dependant conveying heights over 60 m**
- **High operational reliability**
- **Robust design**

Higher kiln capacities and new grinding processes in the cement industry require Bucket Elevators with high conveying capacities and center distances.

AUMUND Double Bucket Elevators type BW-D, are the appropriate solution for the actual requirement.

By means of the structural arrangement of two central chains in one casing and the resulting increase in capacity, the double configuration is especially suitable as circulating Bucket Elevator in grinding plants.



Silo feeding



Loading and unloading station

## HOPPER DISCHARGE AND CRUSHER FEEDING

### ARCHED PLATE CONVEYOR TYPE BPB AND BPB-S/SF

- **Functional solution**
- **Simple scraping off of sticky materials**

For the transport of humid, sticky materials, such as clay, gypsum, anhydrite, puzzolana and marl, Arched Plate Conveyors type BPB, have become accepted as functional solution. The plates – bent in arched shape as their name says – allow a simple scraping off of sticky materials.

Heavy plate conveyors of type BPB-S or SF are applied in quarries, when blast limestone and other raw materials with up to 1,000 mm edge length are to be fed to the crusher.

The conveyors are equipped with **forged chains** and **wear-resistant components**. The plate elements, chain sizes and roller designs are configured according to the related task and required conveying capacity.



Hopper discharge type BPB



Workshop assembly type BPB-SF



Arched Plate Conveyor type BPB-SF





Armoured Chain Conveyor for the discharge from a coal hopper

## ARMoured CHAIN CONVEYOR TYPE PKF

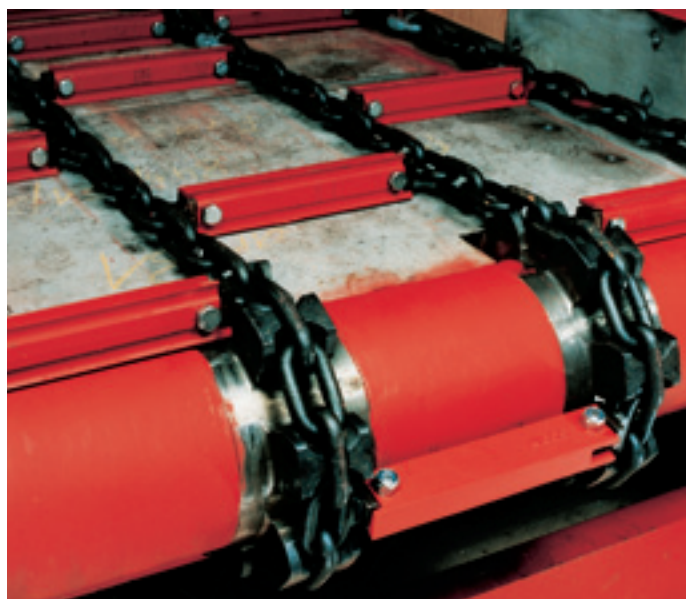
- **Several overall widths**
- **Adaptation to given hopper geometries**

The Armoured Chain Conveyor type PKF, is used as hopper discharge equipment for crushed limestone or for sticky raw materials, such as chalk, gypsum, clay or raw coal.

- Discharge capacities of 10 to over 1,200 t/h
- Overall widths from 600 up to 2,600 mm
- Traction forces up to 680 kN/chain strand
- Chain distances 400, 500, 600 mm
- Two to five strand versions depending on the hopper width
- Low overall height

The Armoured Chain Conveyor conveys in the upper run so that the conveyor trough forms the bottom of the hopper.

Several overall widths permit in each case the most favourable adaptation to given hopper geometries, while the low overall height also enables a subsequent installation into existing conveyors.



Armoured Chain Conveyor type PKF

# PROPORTIONAL FEEDING, PROPORTIONAL DISCHARGE

## PAN-TYPE WEIGH FEEDER TYPE DPB

- Proportional feeding
- Proportional discharge

Based upon the versatile geometry of the AUMUND Pan Conveyors, the Pan-Type Weigh Feeder is applicable for the proportional feeding and the proportional discharge of a wide variety of bulk materials.

The carrier plates of the AUMUND Deep-Drawn Pan Conveyor are applied for the **transport of dusty, grained bulk materials:**

- Clinker
- Slag sand
- Petcoke

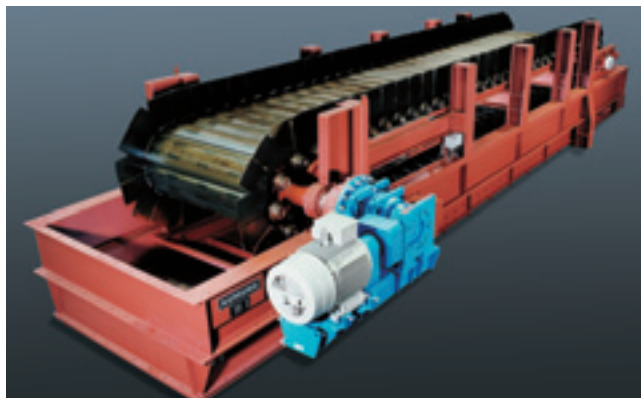
This version of a pan-type weigh feeder is especially suitable for the proportional feeding of the cement mill with clinker.

For the proportional **discharge of bulk materials with poor flow properties**, such as

- Clay
- Gypsum
- Marl
- Limestone
- Puzzolana etc.

the Arched Plate Conveyor with its arch-shaped carrier plates is the recommended design.

For the mill feeding on the raw material side as well as on the final product side, the Pan-Type Weigh Feeder is also available in completely enclosed and pressure-proof design.



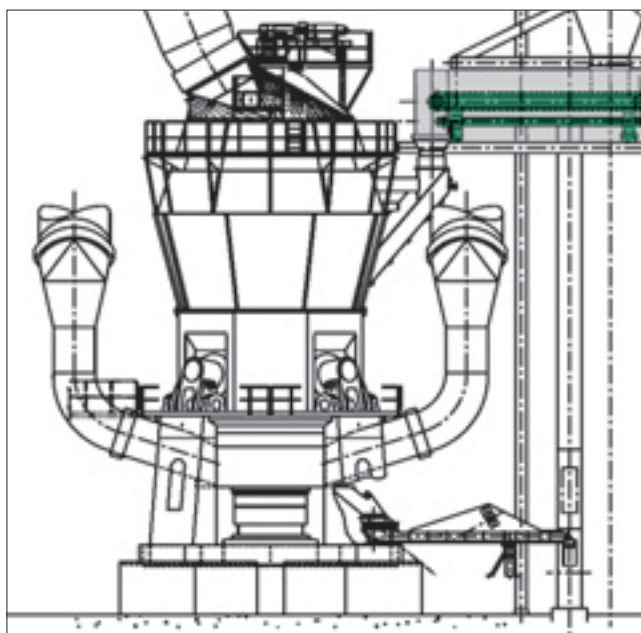
Pan-Type Weigh Feeder with arched plates



Proportional feeding of additives



Pan-type weigh feeder with pans



Mill feeding



## SILO AND HOPPER DISCHARGE



CENTREX® for gypsum discharge with external drive

## CENTREX® TYPE CTX

- Trouble-free discharge
- Continuous lowering
- Compact and rigid design



Trouble-free discharge of sticky and cohesive materials with poor flow properties, such as FGD or natural gypsum with high moisture content.

The logarithmically shaped discharge arm conveys the bulk material radially from the silo wall towards underneath the inner cone where it is discharged through the centrally located outlet. The discharge arm reaches into the material from underneath the material column, undercutting the silo outside wall to prevent material caking and dead zones. Thus, a continuous lowering of the entire hopper content is achieved.

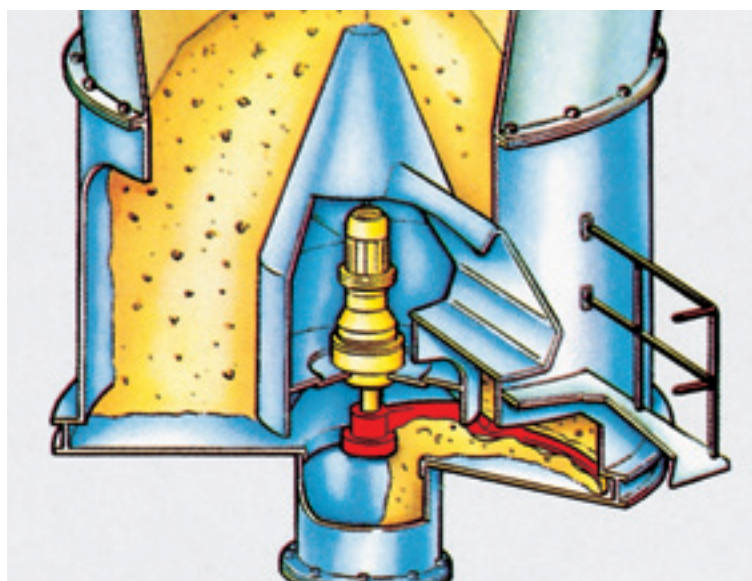
**Segregation and bridging are prevented.**

On account of its compact and rigid design, the CENTREX® is an **ideal solution for installation into or underneath existing silos or hoppers**. Three basic alternatives are available within the CENTREX® system:

- CENTREX® with external drive and rotating inner cone
- CENTREX® with external drive and stationary inner cone
- CENTREX® with internal drive



Internal drive



CENTREX® with internal drive



Chain Conveyor for handling limestone



Silo feeding

## DUST-TIGHT TRANSPORT

### “EN MASSE” CHAIN CONVEYOR TYPE TKF

- Especially wear-resistant design
- Ensures a uniform material flow
- Controlled feeding capacities

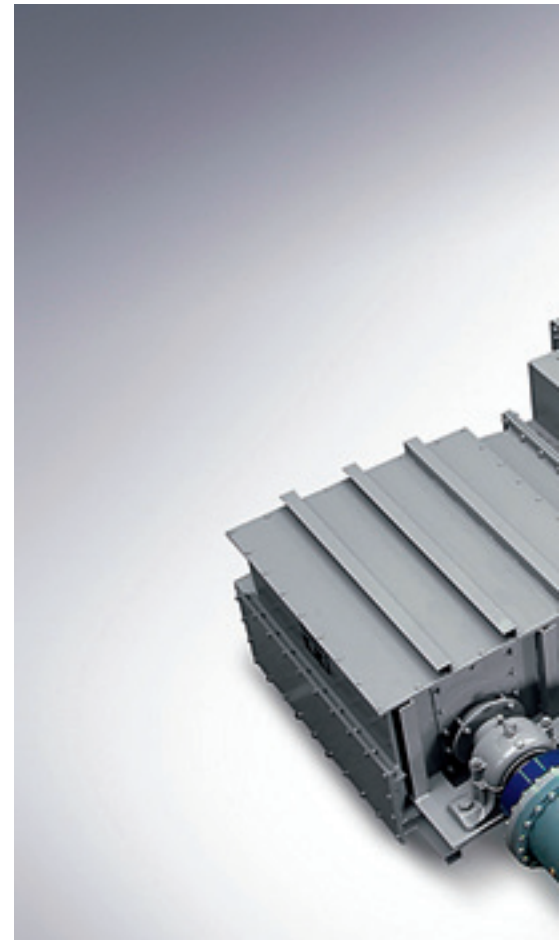


For conveying, distributing, and reclaiming cement and filter dusts as well as coal and additives such as gypsum, anhydrite, sand or limestone.

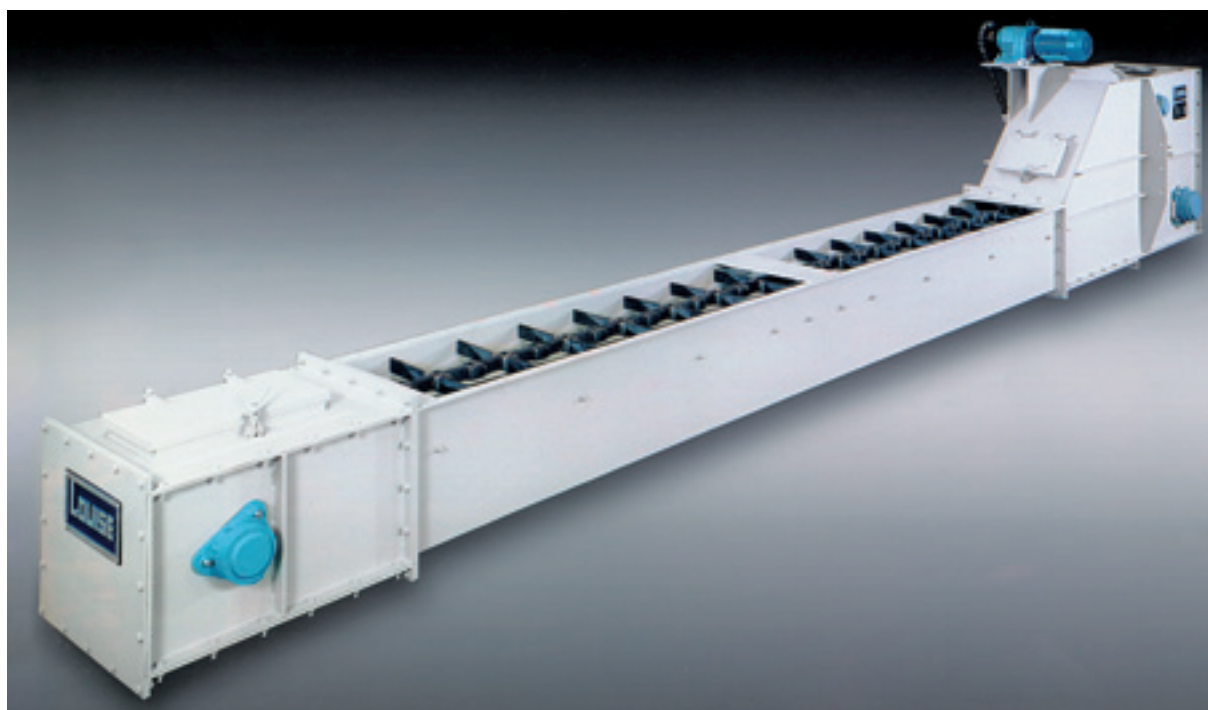
In especially wear-resistant design the Chain Conveyor is also used to convey cement clinker.

- Enclosed conveying path, reduced dedusting effort
- Intermediate discharge through electro-mechanically driven gates
- Wear-resistant design according to the material to be conveyed
- Wear-resistant chains for a long service life
- Conveying capacity up to 500 t/h
- Length up to 50 m
- Shock-pressure proof design as an option

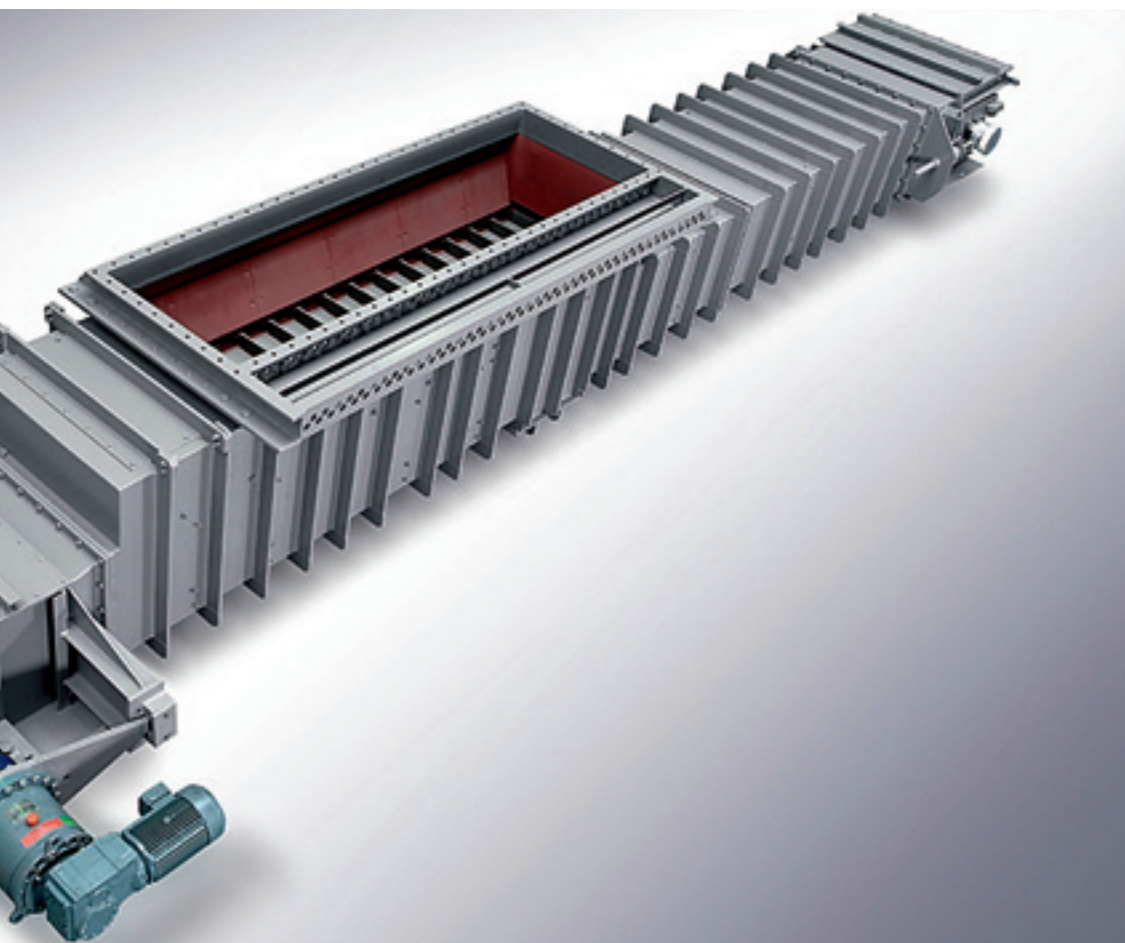
For coal mill feeding applications, all Chain Conveyors come in a design which is shock-pressure proof up to 3.5 bar on a standard basis. Additionally, such Chain Conveyors feature a double-strand chain. A variable speed drive with frequency converter ensures a uniform material flow and a controlled feeding capacity.







Single-Strand Chain Conveyor as filter discharge conveyor with gravity chain tensioning



Chain Conveyor in shock-pressure proof design for coal mill feeding



BEW in block design



BEW in low profile design



## ROTARY DISCHARGE MACHINE TYPE BEW

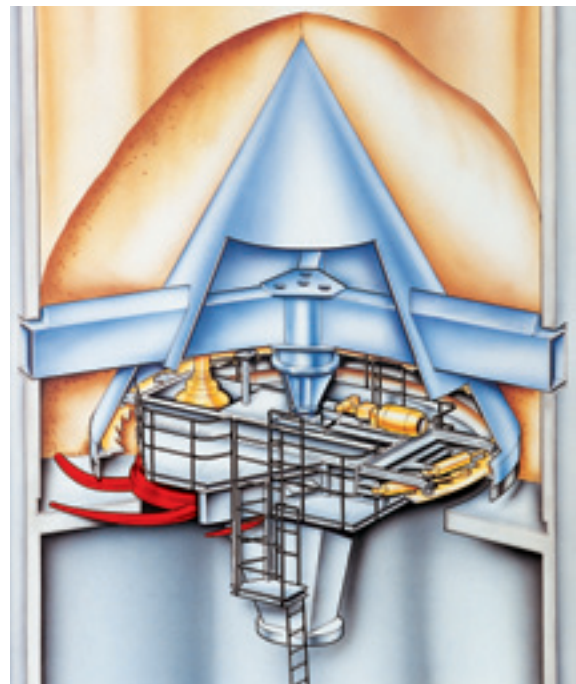
### • Reliable discharge

Rotary Discharge Machines ensure the reliable discharge of a wide variety of different additives or raw materials such as:

- Limestone, marl or dolomite stone
- Natural and FGD-gypsum
- Coal

The **three design alternatives** of the discharge machine allow its adaptation to completely different applications: For the **discharge from longitudinal hoppers or a line of silos**, the flat and low profile design variant is used, while the circulating discharge machine is applied for the **discharge from cylindrical silos**.

For the specific control of the reclaim capacity and for blending the additives when the machine is used in the mill feeding section, the block design model can be additionally equipped with a weigh feeder which comes fully integrated into the mobile discharge machine. On account of the homogenous, volumetric



Circulating discharge machine

reclaim process, the Weigh Feeder allows to reach an accuracy of  $\pm 1\%$ .

The circulating discharge machine guarantees a trouble-free reclaim of material from concrete or steel silos of up to 12 m diameter, offering an adjusting range of 1:10.

- First in / First out
- Simultaneous feeding and discharge
- Proportional reclaim





Truck loading



Ship loading

## CLINKER LOADING TELESCOPIC SPOUT TYPE TKS

- **Integral dust control**
- **Low and heavy duty operation**

The AUMUND Telescopic Spout with integral dust control ensures the loading of clinker into trucks, barges or ships, offering an economic solution for low and heavy duty operation.

The **heavy duty version** of the telescopic spout is designed for rapidly successive loading cycles and high **capacities of up to 700 t/h**. This

system is used in more than 200 installations worldwide.

Applications with approximately five (5) loading cycles per day and loading **capacities of 100 t/h to 150 t/h are the ideal field for the application of the low duty design**. Due to the diminished segments, the smaller hoist and the reduced dedusting volume, this system is the economical solution for installations requiring a low or medium handling capacity.

## UNLOADING EQUIPMENT

### SHIP UNLOADING HOPPER TYPE DDH

- Simple but effective dust capture
- Special construction
- Economic unloading

The mobile ship unloading hopper for bulk materials features a simple but effective dust control system. On account of the unloading hopper design, **small compact filters** replace a large-dimensioned dedusting system.

A special construction separates the hopper into an upper and a lower receiving section. In combination with the negative pressure produced by the compact filters, this **construction enables to retain the dust content**. The collected dust is fed into the main material flow – a simple, yet economic unloading solution.

The bulk material is reclaimed by a gravity silo discharge which permits to feed the material onto the downstream conveyor at the requested output rate.

- Clinker
- Limestone
- Puzzolana
- Coal
- Gypsun



Unloading hopper for clinker and additives



Clinker unloading



Ship unloading into mobile unloading hoppers





Rotary tipper



Front-end tipper

## WAGON UNLOADING TYPE WGK

- **Economic unloading**
- **Safe operation**
- **Environmental efficiency**

AUMUND wagon tippers fully ensure an economic unloading and meet all relevant safety, environmental, efficiency and utilisation requirements.

- Rotary tipper with a tipping angle of 360° and a tipping capacity of up to 30 wagons per hour
- Side tipper with a tipping angle of 150° and a tipping capacity of up to 20 wagons per hour
- Front-end tipper with a tipping capacity of up to 15 wagons per hour

## CLINKER STORAGE

Design, implementation and modernization of clinker storage installations, customised as per requirements.

- Cylindrical steel plate silos
- Special design for extremely large storage volumes
- Concrete silo with steel roof
- Circular storage hall with steel roof
- Circular storage hall with concrete wall and steel roof

**To receive an optimum overall conveying and storage layout, early implementation of experienced layout engineers is recommended.**



Concrete silo with steel roof



Clinker storage hall with concrete wall and steel roof

## CLINKER DISCHARGE

### SILO DISCHARGE TYPE SA

The design principle of the silo discharge gates prevents the free fall of the clinker onto the discharge conveyor. The low throughput rate, corresponding to the discharge rate of the pan conveyor, effectively avoids dust generation (gravity principle).

**The systematic alternating between the silo discharge gates ensures a uniform discharge of the clinker over the whole silo basis.**

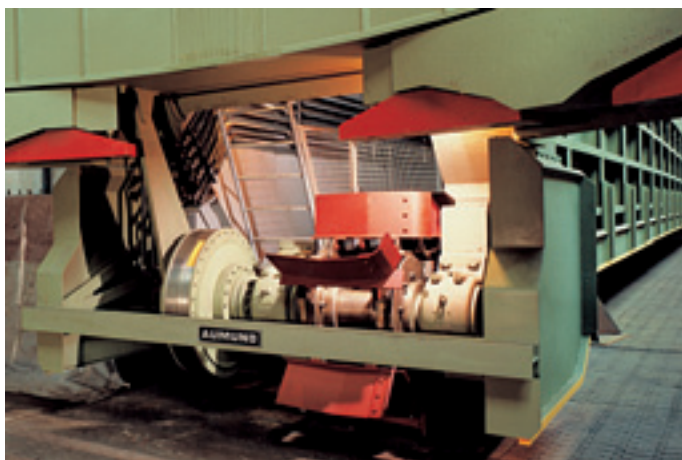


Gravity silo discharge





Version with central column



Scraper chain drive



Covered stockpile with automatic discharge

## **AUTOMATIC CLINKER DISCHARGE TYPE MOLEX®**

- **Successfully operating**
- **Lower investment**
- **Lower operating and maintenance costs**

The discharge system MOLEX® is the successor of the residue-free discharge system 'MOLE' which is successfully operating in several cement plants.

The MOLEX® operates in the same way as the proven predecessor with the difference that no central column is required and the housing structure of the discharge unit is protected from the load of the clinker stockpile by a concrete garage.

- Larger active stock
- Up to 97% clinker reclaim
- Availability of clinker even during yearly kiln shutdown
- Blending of old and fresh clinker
- Blending of coarse and fine-grained clinker
- Almost consistent clinker mixture for mill feeding

Lower investment and/or operating and maintenance costs are the result of:

- Reduction to only one reclaim tunnel
- Less conveyors and discharge gates
- Reduced storage volume, as up to 97% of the volume is active and can be reclaimed
- No residue stock to be removed with loading shovels



**Samson** - Clinker transfer from the truck directly onto the discharge conveyor



## MOBILE BULK HANDLING

- **Wide variety of applications**
- **All kinds of bulk materials**
- **Controlled material transfer rates**

Mobile loading equipment from B&W Mechanical Handling for a wide variety of applications for the bulk material handling in the cement industry.

### Samson Surface Feeder

The Samson Surface Feeder, a mobile discharge and transfer conveyor receives practically all kinds of bulk materials directly from tipping trucks and loading shovels, providing a buffer storage capacity and a controlled material transfer rate onto downstream installations.

Installed above ground, the Samson is the flexible alternative to traditional tipping points with underground hoppers.



**Samson** - Transfer of additives

### Stormajor

The Stormajor **combines the benefits of the Samson feeder unit with a radial outloading boom, with both mounted onto a common chassis as a fully integrated mobile stacker.** Thus, creating vast stockpiles with a minimum of machines and without the use of ramps or underground pits is possible.

### Shiploader

Designed for the **rapid handling of bulk materials for port and terminal operations.** With a loading capacity of up to 2,000 t/h, the mobile Shiploader offers a flexible solution for a wide range of different tasks. Incorporating the Samson feeder unit, the Shiploader receives the bulk material directly from tipping trucks.





**Samson Surface Feeder** - for crusher feeding in a quarry



**Mobile Shiploader** - in connection with Samson Feeder handling clinker for export

As a mobile unit which does not require any fixed installations, the Shiploader retains complete flexibility, **allowing operation on an existing berth with a minimum overall investment.**



**Stormajor** - for stockpiling slag sand





**Semi-Portal Type Reclaimer** in covered longitudinal storage hall for additives



**Stacker and Portal**

**SCHADE**  
AUMUND GROUP

## STOCKYARD TECHNOLOGY

- **Sophisticated stockyard technology**
- **For each plant-specific application**

For the storage and homogenization of the raw materials and solid fuels required in the cement production, SCHADE Lagertechnik offers sophisticated stockyard technology for each plant-specific application.

- Limestone, chalk, clay, marl
- Coal or petcoke
- Natural gypsum or FGD-gypsum
- Slag sand

The design of the SCHADE stackers and scraper reclaimers corresponds to the bulk materials to be stored or homogenised, regardless whether these are abrasive, have a high moisture content or are frozen due to the atmospheric conditions in case of outdoor stockyards.

- Stackers
- Tripper cars for covered longitudinal storage halls
- Bridge type scraper reclaimers
- Portal and semi-portal type scraper reclaimers
- Circular stockyards with cantilever scraper reclaimers, bridge type scraper reclaimers, portal or semi-portal type scraper reclaimers

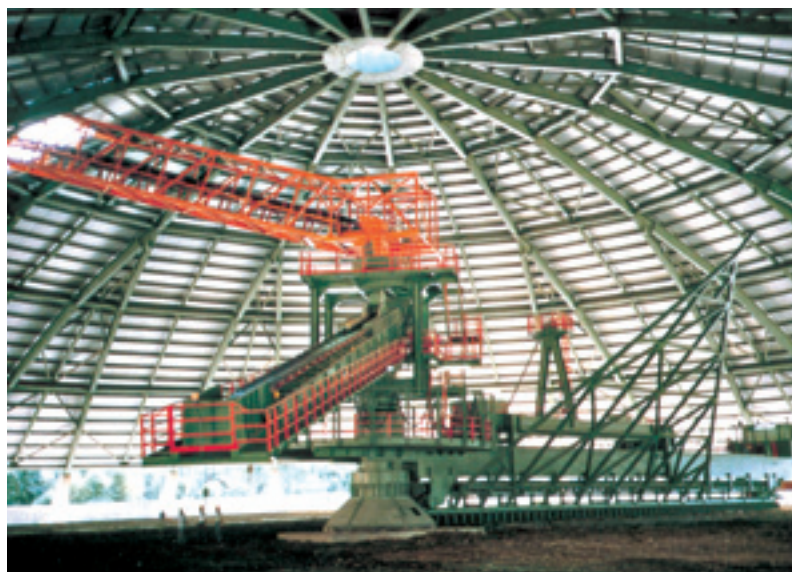


**Cantilever Scraper Reclaimer** in covered





**Type Reclaimer** in outdoor stockyard



**Bridge-Type Scraper Reclaimer** in circular storage for limestone



circular storage for coal or petcoke



**Portal-Type Scraper Reclaimer** in gypsum storage



**Bridge-Type Scraper Reclaimer** in covered longitudinal storage hall for limestone homogenization





Installation of new bucket strand

## CONVERSIONS AND REFURBISHMENTS

- **Upgrading of existing plant components**
- **Targeting increased efficiency**
- **Higher output**
- **Improved availability**

With our expert team of engineers planning selective modernisation measures, we pay special attention to the upgrading of existing plant components, targeting increased efficiency, higher output rates and improved availability.

Upgrading of your materials handling and storage equipment to state-of-the-art technology is achieved through a tailor-made refurbishment process under optimum utilisation of time and budget.

Most of the existing components are re-used in the refurbishment process to save cost.

Engineered conversions and refurbishments for increased efficiency and output are performed on AUMUND equipment as well as on the equipment of other manufacturers.



Pre-assembly of chain strands



## AFTER-SALES SERVICES

### • Customer Proximity around the World

At AUMUND, service does not end at the sale of the equipment. It's the beginning of a long-term partnership. AUMUND offers you a full range of services – from commissioning to the delivery of quality spare and wear parts to customized preventive maintenance programs and equipment upgrades. The benefits for you: Maximum equipment efficiency at lower operating costs.

### • Commissioning and Field Service

Today, presence "on the spot" is an absolute "must". Therefore, our commissioning and service engineers operate from support centers on all continents to guarantee immediate and competent support.

### • Spare and Wear Parts

A comprehensive range of genuine spare parts is available for our entire product range from stocks in Germany, Great Britain and the USA. Our product specialists provide assistance and respond instantly.

### • Retrofits

Aged and worn equipment? Capacity increase needed? Too high operating cost? Aumund "just as new" retrofits are economical and tailor-made solutions for improving your existing equipment at reasonable cost.

### • Preventive Maintenance

Knowing beforehand that service will be needed allows you to schedule downtime and save money with timely repairs. Repairs or retrofits can be accurately anticipated allowing for the downtime to be at the most convenient times and at the lowest possible cost.



## THE AUMUND GROUP

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