



Performance in Stockyard Technologies

SCHADE
AUMUND GROUP

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Circular Storage (Limestone)

Expertise in Stockyard Technology

SCHADE Lagertechnik GmbH is an internationally renowned specialist for the design and supply of equipment for bulk materials stockyards and blending beds for all kinds of industries.

As a member of the AUMUND Group with subsidiaries and affiliates in the UK, France, Brazil, India, China and the USA, SCHADE enjoys the benefits of a global network and a wide range of products.

Since its incorporation in 1879 SCHADE has become a recognised leader in the field of stockyard equipment. Throughout the years, SCHADE's efforts have been concentrated in developing, sustaining and enhancing technological achievements. As pioneers in the Stacker / Reclaimer market, SCHADE has a long and distinguished reputation for innovative engineering and superior quality.

Backed by decades of experience, and with more than 800 references throughout the world, SCHADE provides stockyard equipment of customised design and cutting-edge Stacker / Reclaimer technology. SCHADE's expertise is best demonstrated by the outstanding service lifespan of stockyard equipment operating worldwide under severe conditions.

Close customer relationships, excellent service, superior product quality and the objective to remain in the forefront of Stacker / Reclaimer development are testimony to the commitment to support innovations, identify needs and provide cost-effective and tailor-made solutions for all major industries.

In all major industries

- | Mining & Minerals
- | Iron & Steel
- | Power
- | Cement, Lime & Gypsum
- | Fertilizer
- | Alternative Fuels
- | Pulp & Paper
- | Agribulks
- | Ports & Terminals
and many others

Stockpile Arrangements / Stacking Methods

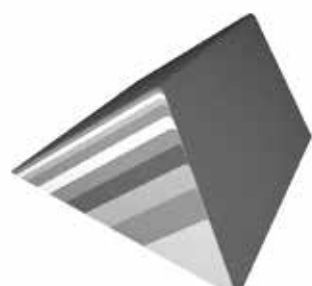
Cone Shell (buffer purpose)



Cone Shell (buffer purpose)



Strate (medium blending purpose)



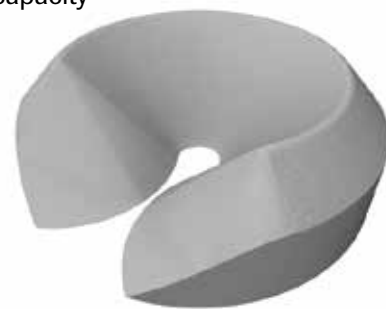
Advantages of a Linear Storage:

- Storage of different bulk materials
- Extension of stockpile

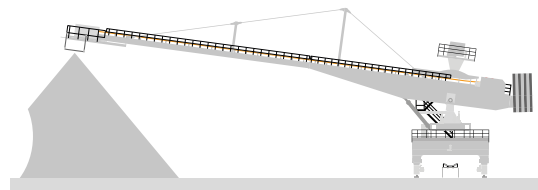


Advantages of a Circular Storage:

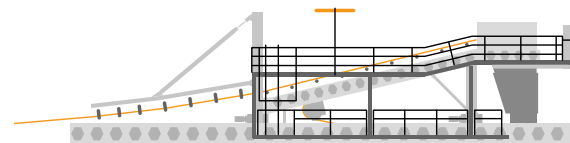
- Low footprint
- High storage capacity



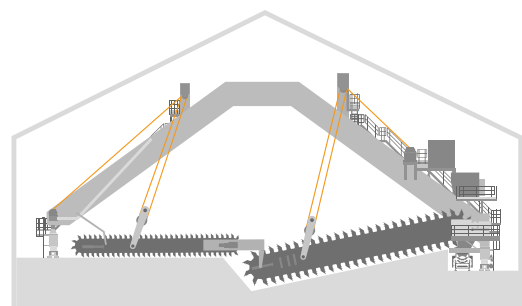
Machine Portfolio



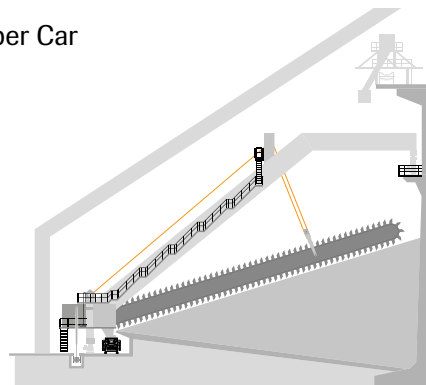
Stacker & Tripper Cars (outdoor / indoor)



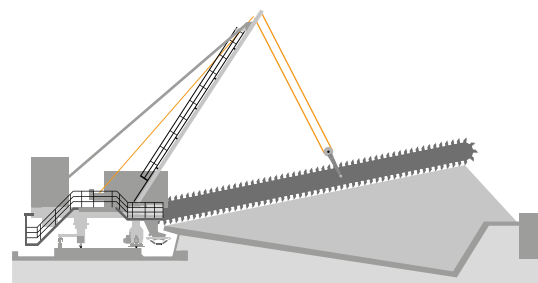
Tripper Car



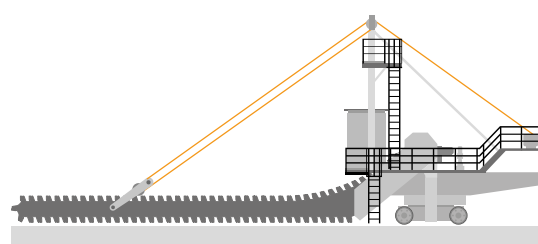
Portal Scraper Reclaimer (indoor)



Semi-Portal Reclaimer (indoor)



Cantilever Scraper Reclaimer (outdoor / indoor)

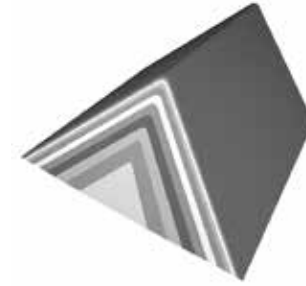


Mobile Slewing Reclaimer (outdoor / indoor)

Windrow (blending purpose)



Chevron (blending purpose)

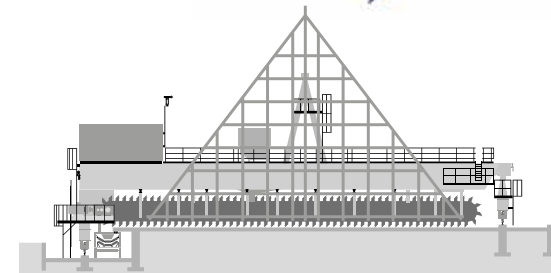
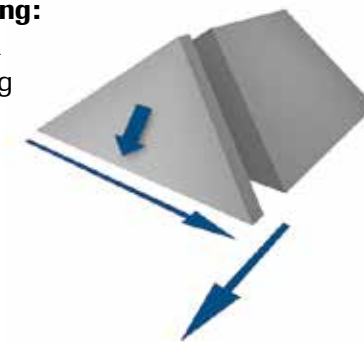


Chevcon
(blending purpose / circular pile)



Frontal Reclaiming:

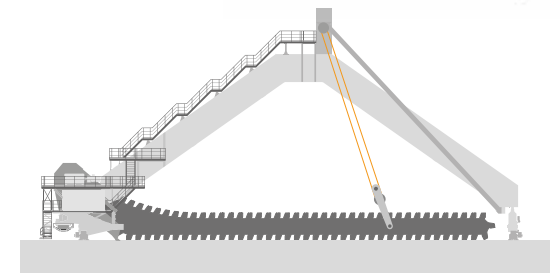
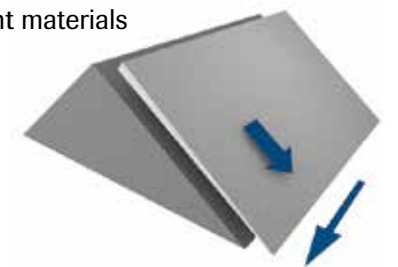
- Suitable for bulk material blending



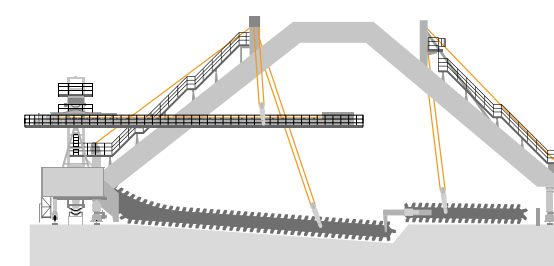
Bridge-Type Scraper Reclaimer (outdoor / indoor)

Side Reclaiming:

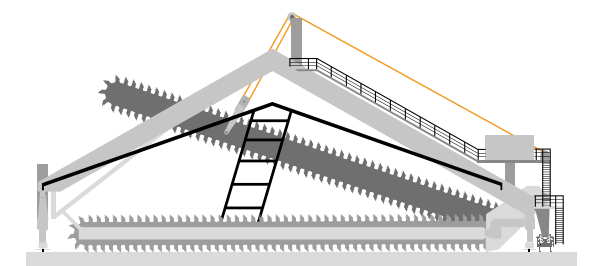
- Suitable for buffer purpose
- Storage of different materials



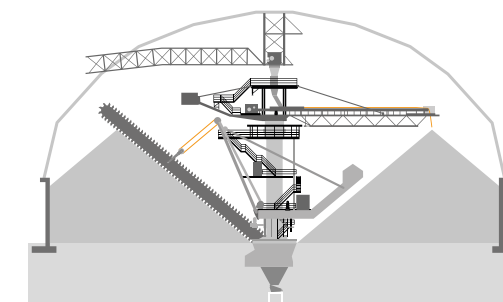
Portal Scraper Reclaimer (outdoor)



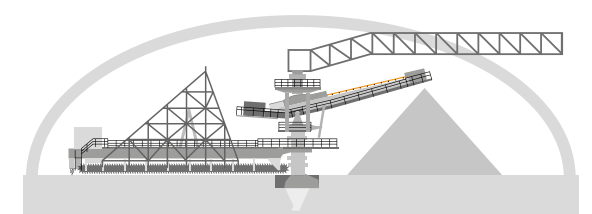
Combined Stacker / Reclaimer (outdoor / indoor)



Multiple Portal Bridge Reclaimer (outdoor)



Circular Stacker & Cantilever Reclaimer



Circular Stacker & Bridge-Type Reclaimer

Stacker and Tripper Carriage



Stacker (Boom-type / Limestone and Serpentine)

Stacking on open-air or indoor stockyards with longitudinal stockpiles

The choice of stacker depends on the stockyard type, and whether its function is buffer storage or blending bed. A Tripper Car on the yard conveyor feeds material onto the Stacker. SCHADE Stacker booms can be equipped with a range of different counterweight arrangements and luffing mechanisms. The lifting mechanism is either a hydraulic system or a rope hoist. The PLC of the Stacker is programmed to control the pre-set stacking method. Chevron and Cone Shell

stacking modes require a travelling and luffing Stacker only, while the Strata and Windrow stacking modes need a luffing and slewing Stacker boom.

Features

- Stacking capacity up to 10,000 tph
- Stacker boom up to 60 m long
- Luffing and/or slewing functions
- Stacking methods: Cone Shell, Strata, Chevron, Windrow
- Smooth belt lift to the Tripper Car to avoid spillage



Stacker (Pylon-type hydraulic)



Stacker (Pylon-type rope hoist)



Tripper Carriage

- Tripper Car with by-pass function available
- Fully automatic operation (SCADA System)
- Explosion-proof design
- Capability to operate in a corrosive environment
- Dust suppression systems available

Bridge-Type Scraper Reclaimer



Bridge-type Scraper Reclaimer (Limestone)

The best possible homogenisation

Optimised blending is achieved with the Bridge-type Reclaimer System, as it reclaims a cross section from the front end of the stockpile, which ideally exhibits many different layers of material. The full facing harrow, a unique SCHADE development, covers the total cross section of the stockpile. This ensures the best possible blending, and a homogenous mix of material flowing onto the reclaiming conveyor belt.

If the bulk material has poor flow characteristics, for example because of moisture content, SCHADE can provide a solution with its Active Harrow System.

Features

- Reclaim capacity up to 3,500 tph
- Rail span up to 70 m
- Low scraper chain speed reduces degradation
- Homogenisation and blending of bulk materials
- Harrow covers the entire pile cross section



Bridge-type Scraper Reclaimer (Wood Pellets)



Bridge-type Scraper Reclaimer (Limestone)

- Active Harrow System for sticky material
- Fully automatic operation (SCADA System)
- Explosion-proof design
- Capability to operate in a corrosive environment

Portal Scraper Reclaimer



Portal Scraper Reclaimer (Fertilizer)

Indoor and outdoor operation

SCHADE offers a wide variety of different Portal Reclaimers, from small-scale machines to the world’s largest capacity heavy-duty machines for outdoor and indoor operation. The unique SCHADE design comprises a very robust portal structure, and a boom guide to withstand horizontal forces and avoid unstable movements of the scraper boom. Together with the SCHADE approach for machine control, this setup allows for long-lasting, trouble-free operation, making SCHADE machines the most sustainable choice on the

market. The fully automatic design can be enhanced with an overall pile management system (SCADA). In particular the large scale and high capacity machines are very highly rated by customers.

Features

- Reclaiming capacity up to 3,500 tph with single boom design
- Up to 7,000 tph with double boom design
- Rail span up to 85 m
- Fully automatic operation (SCADA System)
- Low scraper chain speed reduces degradation
- Indoor design with main and auxiliary boom allows for optimum utilisation of space



Portal Scraper Reclaimer (Coal)



Portal Scraper Reclaimer (Fertilizer)

- Optimised material flow due to specially designed link between main and auxiliary boom
- Feeding via two-way chute onto separate yard conveyors is an option
- Explosion-proof design
- Capability to operate in a corrosive environment

Semi-Portal Scraper Reclaimer



Semi-Portal Scraper Reclaimer (Iron Ore)

The ideal solution for stockyards with limited space

Semi-Portal Reclaimers provide the ideal solution for stockyards with space constraints. Stockyards can easily be divided into compartments with different material qualities. The Semi-Portal Reclaimer achieves the best ratio between the geometry of the building and the stockpile, as the stockpile spans the width of the building from the retaining wall to the semi-portal structure. Usually the Semi-Portal Reclaimer discharges the material over a concrete ramp. The semi-portal

solution is a very flexible, safe and cost-effective option for indoor operations. This well-proven technology is suited to almost all industries.

- Features**
- Reclaiming capacity up to 3,500 tph
 - Rail span up to 65 m
 - Environmentally friendly indoor design
 - Optimised utilisation of space
 - Efficient storage management of different material qualities in different boxes
 - Pre-mixing of materials on the belt with several machines feeding the same conveyor line



Semi-Portal Scraper Reclaimer (Coal)



Semi-Portal Scraper Reclaimer (Additives)

- Feeding via two-way chute onto separate yard conveyors is an option
- Fully automatic operation (SCADA System)
- Low scraper chain speed reduces degradation
- Explosion-proof design
- Capability to operate in a corrosive environment

Combined Stacker / Scraper Reclaimer



Combined Stacker / Scraper Reclaimer (Raw salt)

Two functions combined in one single machine

In cases where simultaneous stacking and reclaiming is not required, SCHADE offers a combined machine for both functions. This design leads to minimised overall weight and costs in comparison to two separate machines. The Combined Stacker / Scraper Reclaimer was first developed and patented by SCHADE in 1970, and is still a popular solution all over the world.

Features

- Reclaiming capacity up to 5,000 tph
- Stacking capacity up to 10,000 tph
- Rail span up to 85 m
- Lower overall costs compared to two separate machines
- Only one conveyor belt is required
- Indoor design with main and auxiliary boom available
- Tripper Car with by-pass function available
- Fully automatic operation (SCADA System)
- Explosion-proof design
- Capability to operate in a corrosive environment
- Dust suppression systems available

Multi-Purpose Portal Bridge Reclaimer



Multiple Purpose Portal Bridge Reclaimer for combined storage and blending (Coal)

Exceptionally versatile design

This machine type has the distinct advantage of offering different types of operating modes. It combines the benefits of the Bridge-type and the Portal Reclaimer. This means that in Bridge Reclaimer operating mode, the blending and homogenisation of the bulk material is provided by the movement of a rope harrow system across the face of the pile, ensuring the blended material is reclaimed by the scraper boom in horizontal position. In Portal Reclaimer operating mode the scraper boom is lifted, and reclaims the bulk material from the side slope of the pile. Additional advantage: the machine is able to travel past stockpiles to other piles for reclaiming.

Features

- Reclaim capacity up to 3,500 tph (in Portal Reclaimer mode)
- Reclaim capacity up to 2,300 tph (in Bridge Reclaimer mode)
- Rail span up to 60 m
- High degree of blending in Bridge Reclaimer operating mode
- Flexibility in Portal Reclaimer operation (change of pile)
- Lower overall costs compared to two separate machines
- Fully automatic operation (SCADA System)

Cantilever Scraper Reclaimer



Cantilever Scraper Reclaimer (Limestone / Gypsum)

Cost-effective solution for small indoor and outdoor stockyards

The Cantilever Reclaimer remains the most cost-effective solution for small stockyards up to 30 m pile width. It has the distinctive advantage of being a flexible and light-weight machine. The Reclaimer travels on a rail track installed along one side of the stockpile, and features a boom with double-stranded SCHADE scraper chain. If used in combination with the Strata stacking method (a SCHADE invention), a certain degree of homogenisation of the stored material can be achieved.

Features

- Reclaiming capacity up to 2,000 tph
- For pile width up to 30 m
- Indoor design for optimum utilisation of space
- Efficient storage management of different material qualities in different boxes
- Pre-mixing of materials on the belt with several machines feeding the same conveyor line
- Fully automatic (SCADA System)
- Explosion-proof design
- Capability to operate in a corrosive environment

Slewing Reclaimer



Slewing Reclaimer (Urea)

A machine for flexible applications and smaller capacities

The Slewing Reclaimer can either travel on a rail track or be equipped with a crawler chassis for maximum flexibility. While reclaiming, the machine progresses into the pile with the boom slewing over the complete pile surface. It is an enhanced design and based on the traditional SCHADE product line "KratzLader" ["Scraping Loader"].

Features

- Reclaiming capacity up to 500 tph
- Extremely efficient utilisation of space
- Small scale machine
- Special designs with elevated or underground discharge conveyors
- Travelling on rail track or on crawler chassis
- Explosion-proof design
- Capability to operate in a corrosive environment

Circular Stacker and Cantilever Scraper Reclaimer



Circular Stacker Cantilever Scraper Reclaimer (Salt)

Simultaneous stacking and reclaiming

Circular Storage based on dual-operation mode enables stacking and reclaiming of the bulk material at the same time, and provides maximum flexibility in the buffer storage system. Another benefit of this design is the ability to store large quantities of bulk materials in a limited space. In addition, this type of equipment enables the complete stockpile to be fully enclosed and protected from environmental impact. Enclosing the stockpile also protects the local environment from dust emissions.

Features

- Stacking capacity up to 10,000 tph
- Reclaiming capacity up to 3,500 tph
- Up to 150 m in diameter
- Storage capacity up to 450,000 m³
- Simultaneous stacking and reclaiming



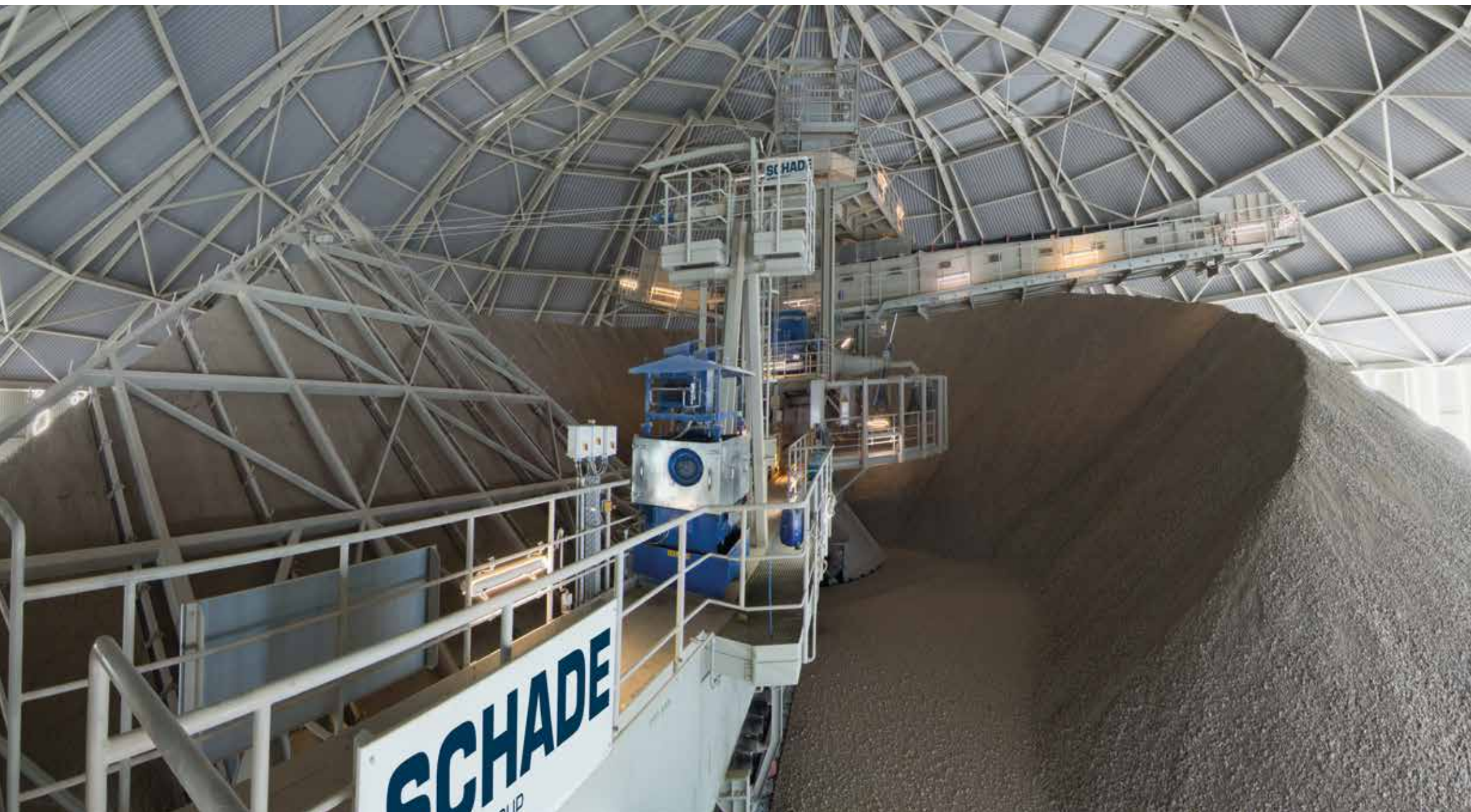
Circular Stacker Cantilever Scraper Reclaimer (Iron Ore concentrate)



Circular Stacker / Semi-Portal Scraper Reclaimer (Coal)

- 360° pile system
- Fully automatic operation (SCADA System)
- Explosion-proof design
- Capability to operate in a corrosive environment
- Dust suppression systems available

Circular Stacker and Bridge-Type Scraper Reclaimer



Circular Stacker / Bridge Scraper Reclaimer (Limestone)

Fully automatic operation for indoor and outdoor blending stockyards

The continuous operation of Circular Storage requires a stockpile built up as a blending bed. The slewing and luffing stacker boom will provide the Chevcon stacking method. The stacker builds up the pile at one end while at the same time the reclaimer operates at the other end of the completed Chevcon pile. This is an endless 360° operating system. The machine is equipped with one harrow, which covers almost the total cross-section of the stockpile. This has the distinctive benefit of ensuring

perfect homogenisation of the bulk material, and provides a constant material flow. If the bulk material has poor flow characteristics, for example because of moisture content, SCHADE can provide a solution with its Active Harrow System.

Features

- Stacking capacity up to 3,500 tph
- Reclaiming capacity up to 3,000 tph
- Up to 130 m in diameter
- Simultaneous stacking and reclaiming
- 360° endless pile system
- Full facing harrow covers the cross-section of the pile
- Active Harrow System for sticky material



Circular Stacker / Bridge Scraper Reclaimer (Limestone)



Circular Stacker / Bridge Scraper Reclaimer (Coal)

- High blending quality and homogenisation effect
- Fully automatic operation (SCADA System)
- Explosion-proof design
- Capability to operate in a corrosive environment
- Dust suppression systems available

Wagon Tippler Designs



SCHADE 'C' Frame Wagon Tippler Unloading System

Robust, reliable and heavy duty construction

Unloading dry bulk materials from open-top rail wagons with SCHADE Wagon Tipplers and Wagon Unloading Systems, is a fast, efficient and cost effective solution.

When combined with the SCHADE Wagon Charger and other ancillary equipment automatic and semi-automatic operation is possible with reduced reliance on manual operation.

SCHADE Wagon Unloading Systems are capable

of unloading rail wagons at rates between <10 wagons/hour to > 60 wagons/hour.

SCHADE offers 4 different Wagon Tippler designs:

- Unit train systems for very high throughput operation
- 'C' Frame tipplers for medium to high throughput operation
- 'Pivot' Frame tipplers for medium to low throughput operation
- 'O' Frame Tipplers for low to medium throughput operation

For turnkey solutions, the SCHADE Wagon Unloading Systems can be combined with our sister company products such as the SAMSON Material Feeders and AUMUND Apron Feeders.

Furthermore, fully automatic dry bulk unloading/intake systems can be combined with our extensive range of stockyard equipment for stockpile management and blended stockpiles generation.



SCHADE Shallow Foundation Pivot-Frame Tippler System



Pivot-Frame Wagon Tippler

Features

- 'C' Frame Tippler can be offered as triple, tandem or single wagon design for a wide range of unloading options
- 'Pivot' Frame Tippler can be offered with combined shallow foundation feeders to reduce the depth of underground foundation construction to <4 m deep, reducing client construction costs
- 'Gentle' unloading is offered to reduce material degradation (e.g. iron ore pellets or HBI)
- A wide variety of rail wagons can be handled (i.e. different lengths, widths, heights and weights)

Wagon Traversers & Chargers



SCHADE Triple Wagon Traverser with on-board Wagon Ejector



SCHADE Wagon Charger with integral spine bar and cable festoon



AUMUND Apron Feeder for hopper discharge

Wagon Tippler Auxiliary Equipment

- In addition to the Tippler equipment, SCHADE can also offer ancillary equipment to complement the unloading process:
- Indexing system for rail wagon bottom-dump (gravity) unloading
 - Indexing system for rail wagon loading facilities
 - Rail wagon Traversers (transborders) c/w on-board wagon ejector/wagon pusher
 - Rail wagon wheel gripper systems for holding/controlling the rake of wagons during the unloading process
 - Wide variety receiving hoppers and extract feeders for onwads processing of the material
 - Travelling de-lumpers for breaking apart frozen or amalgamated material lumps
 - Air aspiration or dust extraction system for controlling fugitive dust
 - Water spray or atomising system for dust suppression

Features

- SCHADE combined systems reduces technical and commercial risk for clients
- Single control system ensures safe and reliable operation
- With containerised MCC house, 'plug & play' electrical installation with reduced commissioning time needed
- Extensive client support during project development stage to assist in identifying the most commercially beneficial wagon unloading system (including layout drawings for inclusion in client's plant layout)

Inspections, Conversions, Spare & Wear Parts, Commissioning



Innovation by SCHADE: Active Harrow System on a Bridge Type Reclaimer

Inspections & Consulting

Highly specialized SCHADE personnel provide qualified inspections and consulting with the aim of increasing efficiency, and maintaining the value and operational safety of SCHADE as well as non-SCHADE machines. The consulting can be extended to a complete feasibility study including SCHADE 3D-Laser Scanning and engineering design.

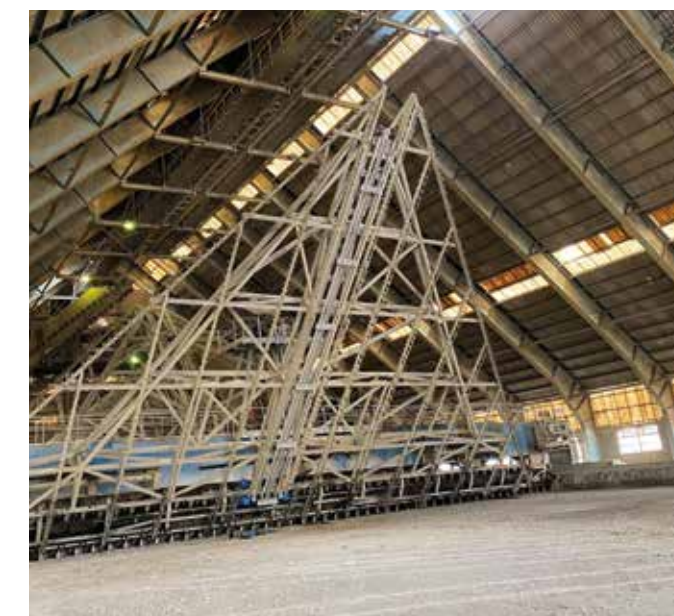
Conversions & Retrofits

Overall equipment efficiency (OEE) demand in conversion can be divided into four segments:

- Capacity increase of the machine for higher material flow rate
- Functionality of operation process. Modification for secured, continuous material flow rate
- Improved blending ratio
- Electrical and digital automation

Spare & Wear Parts

No matter how long ago you purchased your SCHADE machine, SCHADE will supply the appropriate genuine SCHADE spare parts - worldwide and at short notice. SCHADE provides 3D-Laser Scanning and engineering design for almost all spare parts. The company's extensive database assures that it will provide you with exactly the spare part which guarantees the perfect performance of your machine.



Blending ratio and capacity improvement



SCHADE bush chain with outboard rollers ready for shipment

Commissioning & Installation

SCHADE Field Service experts provide:

- Supervision and installation service
- Assembly instructions
- Planning of outages
- Operation and maintenance consulting
- Extended warranty on performance of service inspection programmes

Digital Innovation & Solutions



PREMAS® Preventive / Predictive Maintenance Tools



SCHADE Smart App 4.0

PREMAS® 4.0 Predictive Maintenance Solution

- Digital monitoring of different equipment on stockyard machines
- Optimised maintenance efficiency
- Increased service lifetime with low maintenance costs
- High performance with negligible downtime

SCHADE Smart App 4.0

- Real time condition monitoring
- Evaluation and prediction of maintenance solutions for the main equipment
- Proactive interpretation of monitoring data
- Historical and real time view of key performance indicators



SCHADE Smart Scan 4.0



SCHADE 3D Laserscan and Analytics

SCHADE Smart Scan 4.0

- Measurement of current volume and weight at the storage facility
- Measurement and analysis of the current specific bulk density
- Historical evaluation of bulk material flow
- Increased performance by fully automatic homogenisation process
- Connection of bulk material flow data for automatic storage control

SCHADE 3D Laserscan and Analytics

- 3D scan and engineering design for spare parts and conversions
- 1:1 digital reconstruction of the machine in a new 3D Model
- Reproduction of special spare parts needed to keep the machine running or to convert it
- 3D Model to analyse deformation and functionality

UNESCO World Heritage*



Industrial Cultural Site «Zeche Zollverein» in Essen, Germany

SCHADE Combined Stacker Reclaimer with twin reclaim booms and telescopic stacker boom for coking coal at the Zollverein coking plant – Gelsenkirchener Bergwerks-AG, Western Germany

Stacking capacity: 1,500 tph
Reclaim capacity: 900 tph (450 tph per reclaim boom)
Rail span: 47 m
Supplied: 1973

The Combined Stacker / Portal Reclaimer was developed in 1970 for installation in the Scholven coking plant - Gelsenkirchener Bergwerks-AG, Western Germany. This specific type of machine was developed and patented by SCHADE. It remains a popular solution today, for a huge range of industries and bulk material applications all over the world.

*A World Heritage Site is a landmark or area with legal protection by an international convention administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO). World Heritage Sites are designated by UNESCO for having cultural,

historical, scientific or other form of significance. The sites are judged to contain „cultural and natural heritage around the world considered to be of outstanding value to humanity“.

AUMUND GROUP SPANNING THE GLOBE

The AUMUND Group offers efficient solutions for conveying and storage of bulk materials. A particular strength is the technologically mature and extremely reliable machinery for handling all kinds of bulk materials, even hot, abrasive or sticky. Nearly 24,000 installations worldwide substantiate the excellent reputation and good market position of the Group. The companies of the AUMUND Group are active in about 150 countries with 20 locations all over the world and a global network of almost 100 representatives.

AUMUND Holding B.V. / The Netherlands

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AUMUND Fördertechnik GmbH / Germany
Branch Office Dubai / U.A.E
Branch Office Wrocław / Poland

AUMUND S.A.R.L. / France

AUMUND Corporation / USA

AUMUND Ltda / Brazil

AUMUND Machinery Technology (Beijing) Co. Ltd / China

AUMUND Asia (H.K.) Ltd / Hong Kong / China
Branch Office Jakarta / Indonesia

AUMUND Engineering Private Ltd / India

SCHADE Lagertechnik GmbH / Germany

SAMSON Materials Handling Ltd / GB
Branch Office Bristol / GB

AUMUND Group Field Service GmbH / Germany

TILEMANN GmbH / Germany

AUMUND Logistic GmbH / Germany

The AUMUND Group operates Service Centres and Warehouses for spare parts in Germany, the USA, Brazil, Hong Kong, Saudi Arabia, and in Great Britain. Almost 60 dedicated Supervisors tend to clients' needs across the globe and a specialized PREMAS® Team provides Preventative Maintenance and Service support including inspection and consulting.

SCHADE
AUMUND GROUP

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