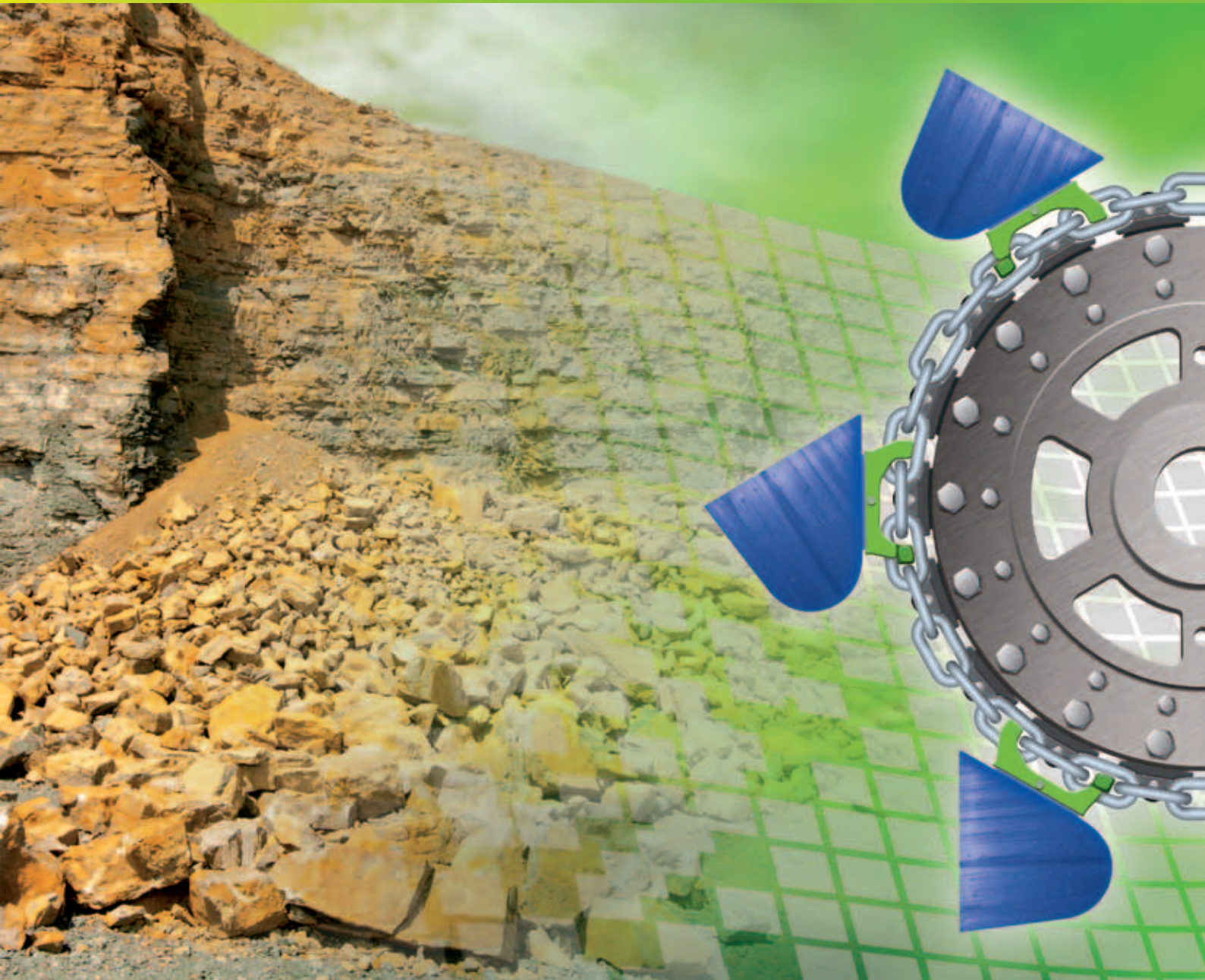


The BULKOS logo features a stylized blue gear-like icon on the left, composed of several blue segments. To its right, the word "BULKOS" is written in a large, white, bold, sans-serif font. The letter "O" is replaced by a blue chain link. Below "BULKOS", the words "THE BULK SOLUTION" are written in a smaller, blue, sans-serif font.

Customised
conveyor systems
for bulk materials

ENG
_EDITION_3





Welcome to RUD

Sling and Lashing Systems

Conveyor Systems

Hoist Chains and Drive Systems

Tyre Protection Chains

Non-Skid Chains

Human Care

Outdoor Furniture

Military Technology



RUD's Mission Statement

We are a dynamic and modern family enterprise, that is active worldwide. We have held key positions in the mechanical engineering fields of forming, welding, heat treatment, surface technology, forging and machining for 135 years. That is the best qualification for a company's future as a "Hidden Champion of the 21st Century".

RUD the hot-house of ideas

When it comes to hoisting, pulling and conveying, our RUD hoisting chains, detachable RUD lifting points and RUD conveyor systems are a byword for quality, innovation and safety. RUD and Erlau non-skid chains allow safe driving whether on snow and ice or on the toughest off-road terrain, and also have innovative fitting systems and a long service life.

RUD and Erlau tyre protection chains protect the treads and side walls of the tyres of earth moving machines.

The Erlau range of outdoor furniture offers attractively designed and elegant seating. Our Erlau Human Care products, safety and grab rail systems for sanitary facilities offer high degrees of flexibility and individuality.



RUD's innovation strategy

RUD sets the new technological standards. Our products combine the most advanced technology with clearly defined environmental management. As far as we're concerned, that means continual growth accompanied by systematic conservation of all the resources required. We always strive for perfection, and regard what we have achieved as the basis for new ideas.



Conveyors and conveying systems for all types of bulk materials

Cement/lime building materials plants

Soda plants

Gypsum

Recycling of building materials

Potash

Stone and gravel works

Port facilities

Fertilizer

The chemicals industry

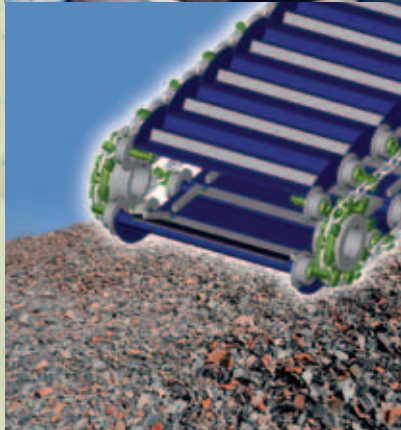


BULKOS “the bulk solution”- reliable conveyor technology for all types of bulk material

The ability to guarantee high availability of building materials is a major challenge in the field of bulk materials. System availability and reliability are often not considered in this context. Simple and quick solutions only bring short-term success. Poor quality, individual components that do not work together well and neglected maintenance may lead to a breakdown during operations.

For decades, RUD has been an experienced manufacturer and supplier of chain equipment and complete systems for the bulk materials industry, including bucket elevators, scraper conveyors, drag chain conveyors, screw conveyors and apron feeders. Our engineers help you with the planning and dimensioning of your systems. Our service technicians monitor the way the individual components work together, track their wear and tear, and maintain your conveyor systems.

BULKOS minimises breakdowns in your operation and maximises systems reliability.



Thanks to our long-standing experience in the construction and supply of bucket elevators and transport systems for bulk materials, we know which services our customers value. As a result, we have been able to develop three sophisticated concept modules, which cover everything from design calculations to long-term maintenance of components and complete systems for conveying bulk materials.

The **product concept** defines the benefits offered by RUD BULKOS in-house-manufactured components for highly flexible conveying conditions.

Our **engineering concept** provides you with support and advice from the planning stage, through design calculations and dimensioning, right up to the point when your system is commissioned.

The **service concept** covers technical consultation, maintenance and documentation, installation and modification of your systems, as well as the installation of optimised chain and related equipment.



Milestones in the history of RUD's chain technology

4

1875 RUD Ketten Rieger & Dietz GmbH u. Co. KG is founded

1945 The conveyors line of business is established by Werner Rieger

1961 Long-link, case-hardened round steel chains are introduced for high-performance bucket elevators

1985 RUD Super 35 round steel chain is introduced

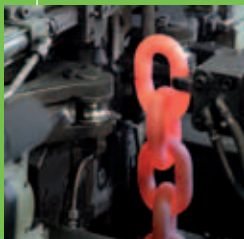
1994 RUD central chain is installed in a high-performance bucket elevator

1906 RUD is the first company to introduce electrically powered welding of chain links

1965 First 40cG-quality round steel chain is introduced, market launch of RUD two-link attachment System 65

1992 RUD apron feeder launched

2001 Market launch of RUD two-link bucket attachment SWA



Milestones in the history of H&E conveyor systems technology



1932 Engineering office for conveyor systems is opened

1945 Herfurth & Engelke engineering works is established

1960 First belt type bucket elevator

1970 First drag chain conveyor for 600 t/h

1973 First screw conveyor for 300 t/h

1981 First vertical screw conveyor

1988 Parallel weight take-up station is developed for bucket elevators, transport of 3,000 t/h (belt conveyor)

2001 First central bucket elevator for 600 t/h

1933 Design of the first continuous conveyor for bulk materials

1940 In-house production starts: First chain type bucket elevator, first screw conveyor, first apron feeder

1969 First chain type bucket elevator for 300 t/h

1972 Transport of 1,000 t/h (belt conveyor)

1985 Development of high-performance bucket elevator, first use of a steel-rope belt in a bucket elevator

1998 First central chain type bucket elevator, first chain type bucket elevator for 1,100 t/h



Together, we offer 200 years of expertise in conveyor technology for bulk materials

2004 H&E becomes part of the RUD Group

2006 Market launch of RUD two-link bucket attachment 2win

2008 Central chain type bucket elevator for 600 t/h

2011 First Tool-Mover

2011 **BULKOS**

2007 RUD FORKY forked chain

2009 First drag chain conveyor with RUD FORKY forked chain

2011 First tandem central chain bucket elevator for 1,500 t/h



2012 First Biogas-Feeder



RUD – Production “Made in Germany”

Through the combined expertise of RUD and H&E, we offer you the right system for any conveying requirement you may have. Our global network enables efficient, group-wide collaboration, coordination

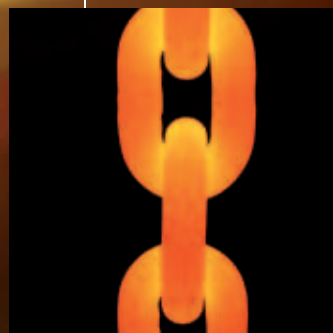
and communication. Our plants are among the most innovative chain production sites in the world, and all are highly automated. Highly qualified experts work in our machine parks across the globe.

Chain Production

Machining

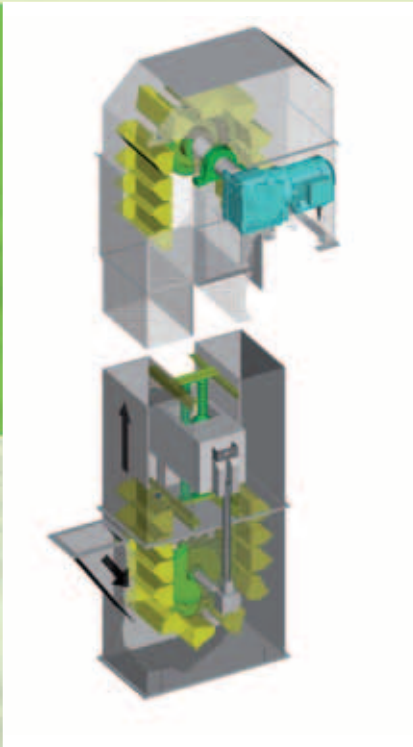
Heat treating

Mechanical engineering



Complete bucket elevators and spare parts

6



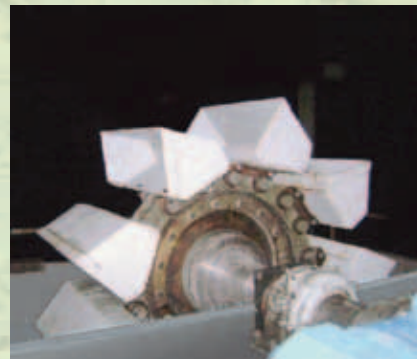
BULKOS complete bucket elevators

BULKOS complete bucket elevators are ideally suited to vertical conveying applications for powdery, granular, lumpy and high-temperature bulk materials.



BULKOS round steel chain type bucket elevators

BULKOS round steel chain type bucket elevators enable handling of materials even under the toughest conditions, such as high temperatures or bulk flow rates. Our multiple link bucket attachments are robust and ensure a high degree of safety during transport.



BULKOS high-performance central chain type bucket elevators

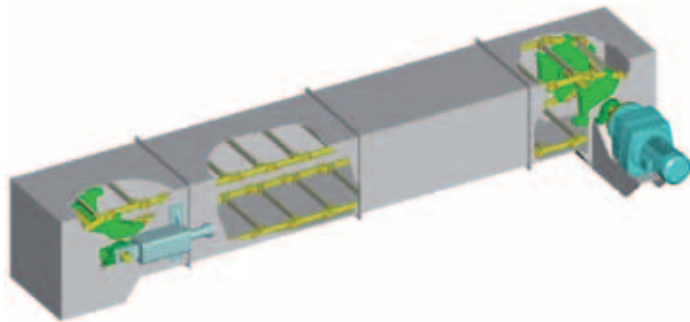
BULKOS central chain type bucket elevators are mainly used to provide maximum conveying capacities in extreme conditions, and to meet high-speed conveying requirements. Their design ensures a long operating life.



BULKOS-belt type bucket elevators

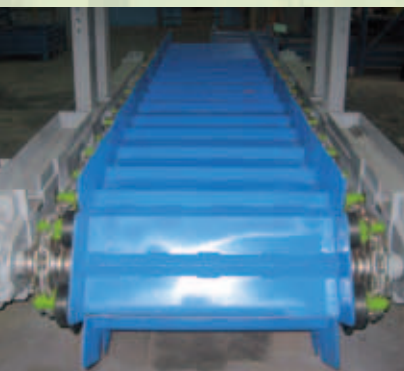
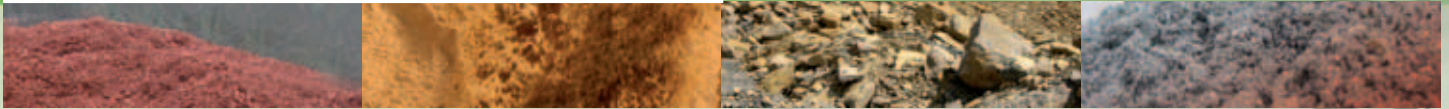
BULKOS belt type bucket elevators, reinforced with textile or steel inlays, ensure easy transport of materials, even to the highest of conveying heights. Their virtually noiseless operation is an additional benefit.

Complete conveyor systems



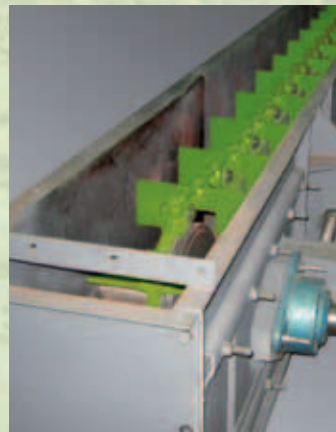
BULKOS complete conveyor systems

BULKOS conveyor systems offer complete systems for transporting your materials. Equipped with forked chains or round steel chains, they ensure smooth operation of your systems.



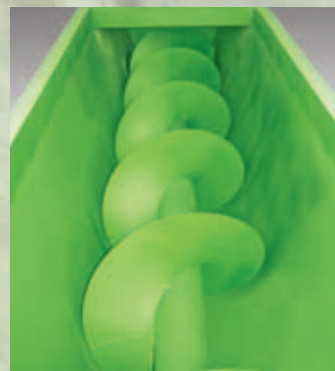
BULKOS apron feeders

BULKOS apron feeders are based on round steel chains, and are very robust. Thanks to a closed slab cover, the chains remain clean during operation. Wear and tear is thus minimised.



BULKOS drag chain conveyors

BULKOS drag chain conveyors are suitable for the dust-free, horizontal and slightly inclined conveying and metering of even the coarsest types of bulk materials. Available as single-strand or double-strand conveyers, they offer high wear and heat resistance. A special model is available with a cleaning scraper.



BULKOS screw conveyors

BULKOS long-lasting, low-maintenance screw conveyors are used for horizontal, inclined and vertical transport of fine-grained, floury materials, coarse-grained, high-temperature, abrasive or slow-flowing materials. Available as single, double or triple conveyors.



BULKOS scraper conveyors

BULKOS scraper conveyors are designed to handle the addition and removal of fuel and waste during production processes.

Components for round steel chain applications

8

Performance criteria
for RUD chains

Wear
and tear

Durability

System availability
(operational reliability)

Breaking
strength



BULKOS chains

Due to their excellent chain core toughness, BULKOS chains, available in special sizes, offer high breaking strength and resistance to brittle fracture. The chain geometry is always matched to all system components in terms of its resistance to fatigue fracture. This is the only way to ensure safe and long-lasting operation. In addition, RUD's quality strategy ensures that our products are continually optimised.



BULKOS chain connectors

BULKOS chain connectors are designed to be highly wear-resistant and case-hardened for use in conjunction with BULKOS chain systems. They are extremely robust and serve as an industry standard. BULKOS chain systems work with both toothed and non-toothed drive wheels. Depending on the application, they run on grooved wheels or plain reversing wheels. In accordance with the RUD quality principle, chain connectors are very easy to mount.



BULKOS sprockets

Sprockets are used in BULKOS conveyor systems, in particular in System 65. BULKOS sprockets are made of case-hardened cast steel and are available in a segmented version with replaceable individual tooth discs, which are highly wear-resistant. The shape and wear resistance of the sprockets are always tailored to match the exact quality of the RUD round steel chain.



From the smallest to the largest conveyor capacity classes for bulk materials

Safety against fracture

Net weight of chain strand (energy efficiency)

Price/performance ratio

Effects on the system



BULKOS chain wheels

When faced with very challenging bucket elevator applications, we pay particular attention to the design of the BULKOS reversing and tensioning wheels, as the reliable functioning of these components is critical in determining the life-span of the chain equipment. The contact surface is induction hardened to deal with tough operating conditions. Grooved wheels or plain reversing wheels are used, depending on the application.



BULKOS attachments

In the BULKOS system, attachments can be supplied to handle from the smallest to the largest conveying capacities. RUD only uses multiple-link attachments that ensure smooth operation and high-level operational reliability. Multiple-link attachments also enable handling of larger capacities and longer life-spans.

We can provide bucket attachments for the back or side walls of the bucket.



BULKOS buckets

Our BULKOS buckets offer a high degree of flexibility. Customised in accordance with the dimensions of your housing, we can always supply the perfect bucket for your chain equipment. A wide range of shapes and models is available.



Components for central chain type bucket elevators

10

Insert pins



Install outer flat link



Straighten the chain - and you're done, no tools required!



Bucket attachment
Bucket mounting

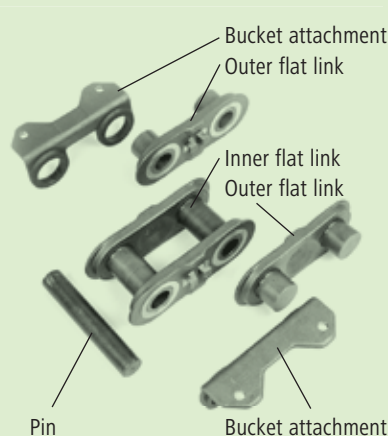
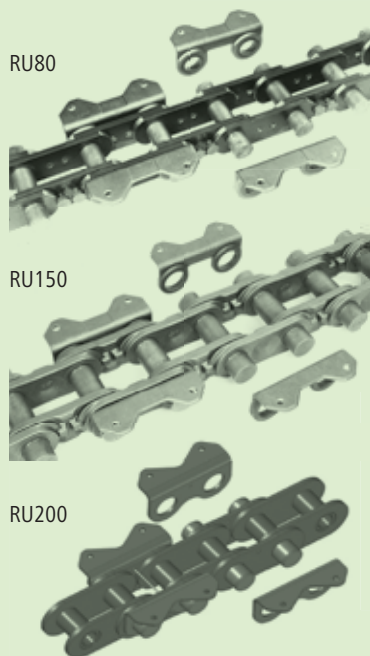


Simply bend the chain links at any point to open, shorten or extend the central chain.

BULKOS central chains

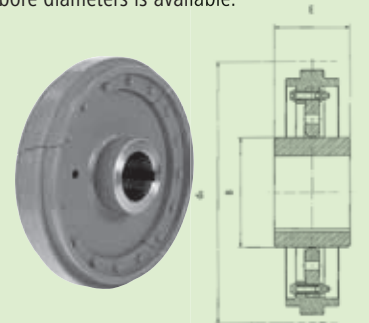
RUD central chains are ideally suited to use in high-capacity bucket elevators. The RUD central chain provides a robust means of traction for vertical conveying of powdery, granular, lumpy and high-temperature materials. Safe transport of abrasive materials is also guaranteed. RUD central chains offer maximum conveying reliability, even when handling charge fluctuations, high-temperature materials, and materials with large single edge lengths. BULKOS has the perfect chain to meet your individual needs.

The central chain comprises of four basic elements, i.e., the inner flat link, the pin, the outer flat links and the bucket attachments. The chain is designed to be easily put together and taken apart without tools – simply bend the chain links at any point to open, shorten or extend the chain. A favourable distribution of force and tolerance compensation is achieved by having the bolt bearings located on the outer flat link, which is also designed with bushings. The bucket is attached using the stable bucket brackets on both sides, which are pushed onto the bushings of the outer flat links. When the chain wears out, it can simply be turned over and run on the unused side to further extend its service life



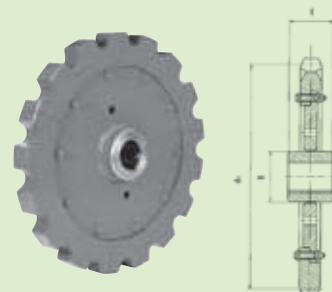
BULKOS-drive wheels

Plain drive wheels are used in BULKOS high-capacity bucket elevators. Their contact surface is partially case-hardened for added robustness. A wide range of pitch circle and bore diameters is available.



BULKOS tension sprockets

In the case of high-output bucket elevator applications, we pay particular attention to the design of the BULKOS tension sprockets, as the reliable functioning of these components is critical in determining the life-span of the chain equipment. Their contact surface is partially case-hardened. Available with a wide range of pitch circle and bore diameters.



Components for the **FORKY** forked chains for drag chain conveyors

Sophisticated wear indicator

Extra large radii

Deburred holes

Reduced weight

Highest strength and durability in use

FORKY forked chains

FORKY forked chains from RUD are set apart by their excellent material properties. Drop-forged alloyed steel ensures the highest possible strength and long-term durability in your applications. The unique RUD heat-treatment process guarantees consistent material quality, and therefore a high level of system availability.



The forked chains are manufactured to the highest quality standards using drop-forging, which optimises grain flow orientation. FORKY forked chains are available as a single-strand or double-strand solution.

FORKY sprockets/wheels

FORKY sprockets are segmented and are made from C45. The tooth flanks are induction hardened. The sprocket elements are exchangeable on the fitted hubs. BULKOS reversing wheels are also made from C45. Their contact surface is induction hardened.



FORKY scrapers

A wide range of FORKY scrapers is available. FORKY offers you the best solution to meet your conveying requirements.



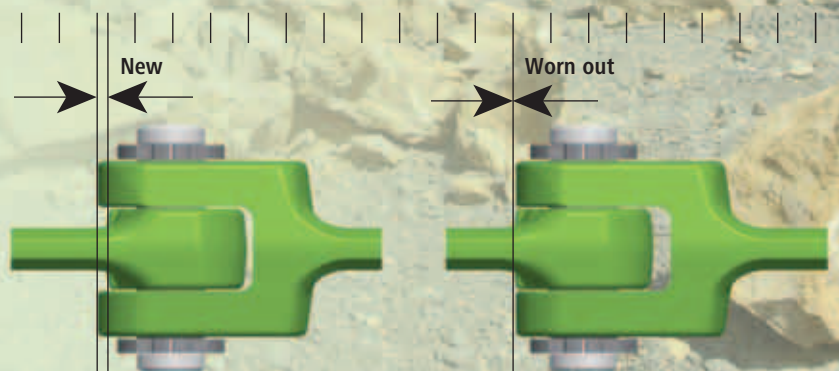
FORKY accessories

We're always ready to provide you with any spare part you need for your FORKY system.



FORKY wear indicator

A clever visible wear indicator provides an instant overview of all wear in your system. At a glance, you can determine the condition of each individual chain link. This feature makes breakdowns causing unplanned downtime a thing of the past.

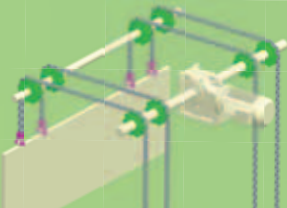


Drive systems for bulk materials handling

12



Lifting – Door drives



Moving – Omega drive



Telescope drive



Sliding – Drives for opening and closing



Turning – Transmission Drive



Possible applications:

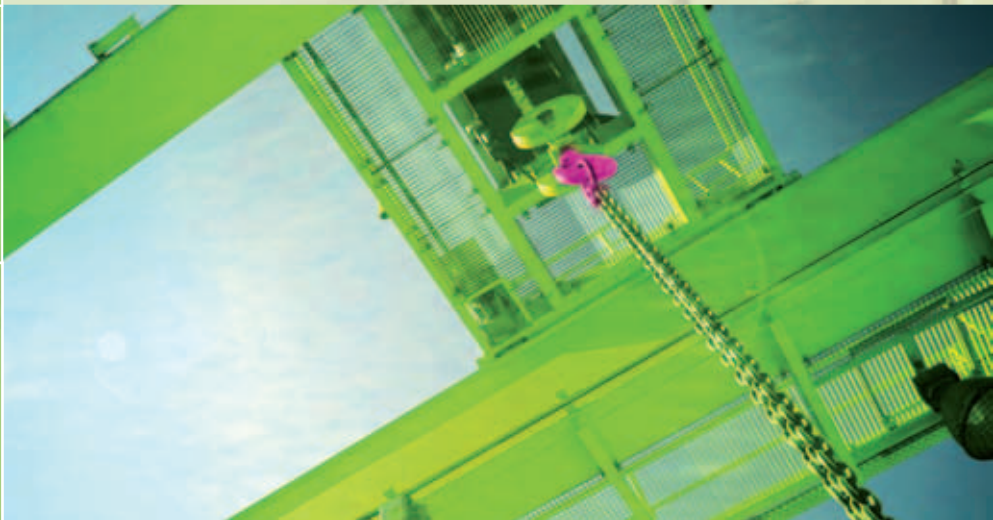
- Lifting of industrial doors
- Moving of sliding doors
- Drive of goods elevator
- Adjusting of cranes
- Stock logistics

Drive systems for bulk materials handling

BULKOS drive systems offer the optimum solution for diverse drive and transmission tasks. On the basis of round steel chains as traction mechanism we develop and manufacture a big range of drive systems for lifting, moving, telescoping or sliding in bulk materials handling applications.

BULKOS drives are robust and perfectly suited to the conditions in the environment of bulk materials handling.

Through our experience in the transport and handling of fertilizer, potash and salt, our components and systems are perfectly synchronized to each other and provide a maximum of operational reliability.



System comparison: single-link versus multiple-link attachments

| | | Single-link attachment | Multiple-link attachment |
|--|--|------------------------|--------------------------|
| | Brace support in the chain strand | + | +++ |
| | Suitability for coarse-grained materials | + | +++ |
| | Suitability for high-capacity buckets | ++ | +++ |
| | Wear and tear on attachments | ++ | + |
| | Wear and tear on chain | + | ++ |
| | Component break resistance | + | +++ |
| | soggy/viscous materials | + | ++ |
| | System reliability/availability | + | ++ |



BULKOS bucket attachments

Bucket mounting with a multiple-link attachment enables optimal bucket support during scooping and emptying, variable bucket spacing (which can be adjusted at any time) and problem-free installation. Maximum conveying capacities and smooth, low-noise operation are other distinctive features. The use of highly wear-resistant components ensures a long life-time for the chain.

BULKOS-System 65

System 65, with its multiple-link attachment, is robust, highly wear-resistant and easy to mount. The buckets can be replaced easily. This system is suitable for heavy loads and high conveying speeds.

BULKOS-System SWA

System SWA is mainly designed for use in bucket elevators with gravity discharge and for centre discharge bucket elevators and positive discharge snubbed bucket elevators. It is easily mounted and runs on wheels for smooth operation.

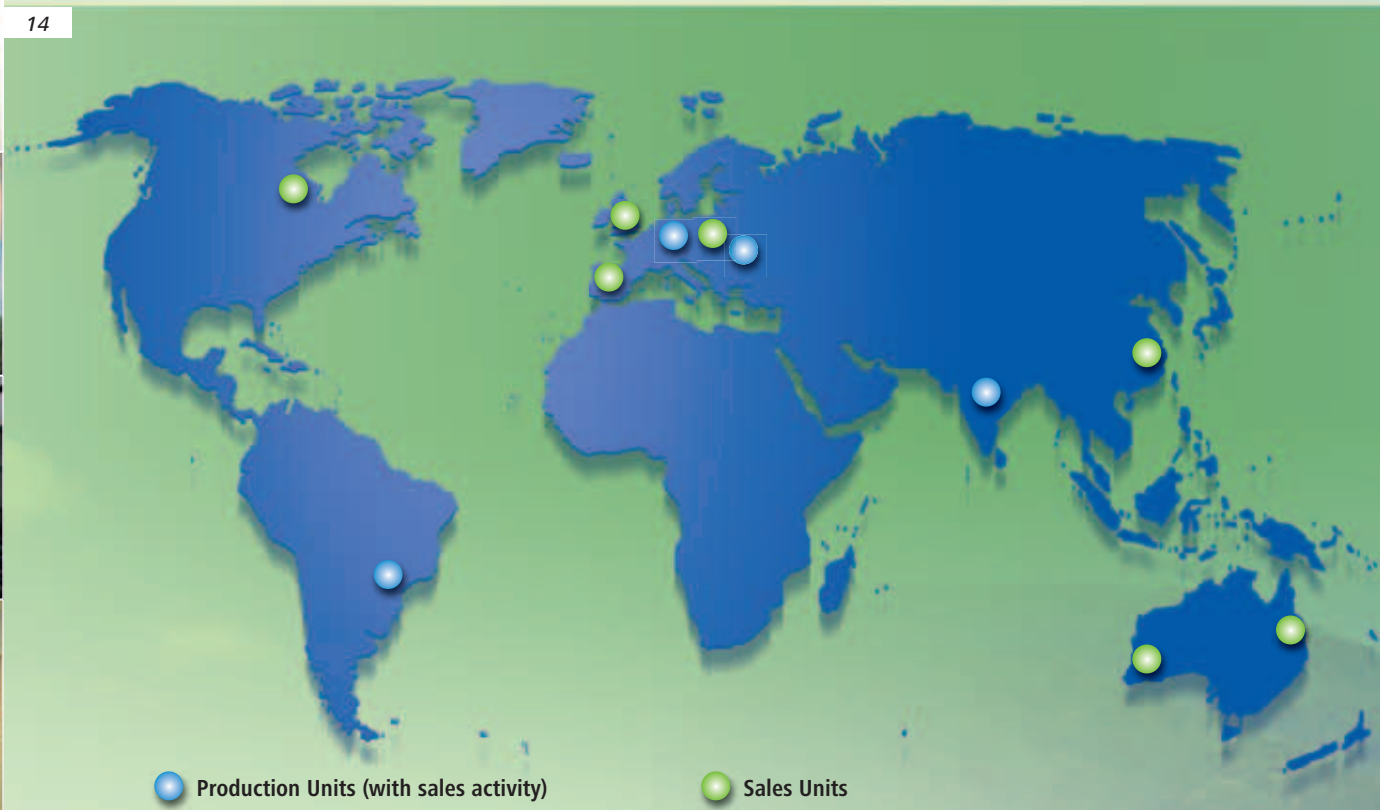
BULKOS®-System 2win

Endless chain strands can also be used in the 2win double-link attachment system. The attachment runs on toothed or non-toothed wheels. The system is characterised by the speed at which it can be mounted and dismantled without specialised tools. The 2win System replaces all established bucket back wall attachments on the market.



RUD Service world for trouble free conveyor technology

14



The BULKOS service concept for maximum conveying capacity

- On-site consultation available
- Measuring and testing of conveyor systems
- Inspection
- Fault elimination
- Consultation and recommendations for spare parts
- Maintenance/repair of conveyor systems

Our service technicians monitor the supported conveyor systems at defined intervals, make regular assessments of wear and tear, and prepare quotations for spare parts in time.



On request, wearing parts can also be replaced directly by our service technicians. Maintenance documentation also is part of our service.

- Replacement of competitor products with RUD products
- Quick availability of special-order materials
- Delivery of components
- Delivery of spare parts, on-site installation
- Complete installation Provision of topping-out supervisors
- RUD Expert Portal



Engineering concept: calculation, projecting and consulting

CAD data of components (standard) available on request

System retrofits/conversions

Dimensioning and calculations

Technical consulting

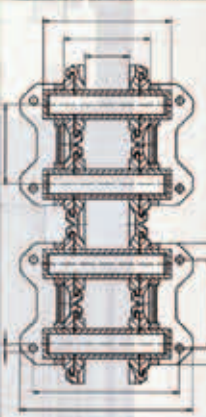
Problem-solving

Product development

Complete bucket elevators



The best solution to meet your needs!



BULKOS stands for concentrated expertise

Each bucket elevator has its own specific conveying requirements. In most cases, you cannot assume that a standard configuration will suffice. This is why our BULKOS experts use your plant data to design customised systems solutions to meet your conveying needs.

Your BULKOS calculations:
We calculate the best system to suit your individual needs.
We have the ideal solution for every material.





www.rud-bulkos.com

Global presence and global distribution of BULKOS conveyor systems

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For information about
other RUD products, i.e.:

- Lifting accessories and securing equipment
 - Military technology
 - Hoist chains
 - Drive technology
 - Tyre protection chains
 - Snow chains
- visit www.rud.com
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