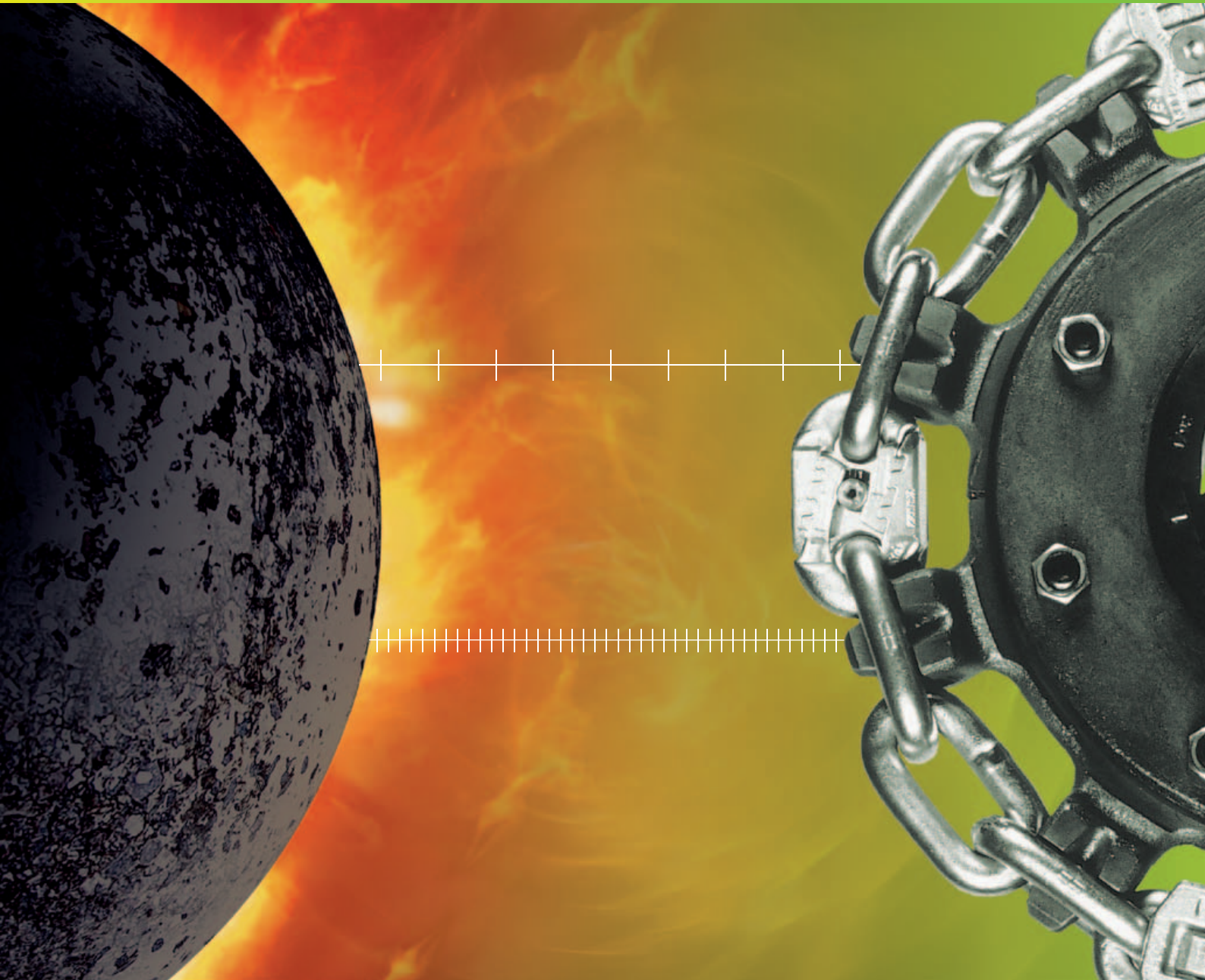


The CRATOS logo features a stylized blue fan-like graphic on the left, followed by the word "CRATOS" in a large, white, bold, sans-serif font with a registered trademark symbol (®) to its upper right. The letter "O" is replaced by a blue silhouette of a person holding a gear. Below the main text, the words "UNLIMITED POWER" are written in a smaller, white, sans-serif font.

UNLIMITED POWER

ENG

EDITION_3





Welcome to RUD

Sling and Lashing Systems

Conveyor Systems

Hoist Chains and Drive Systems

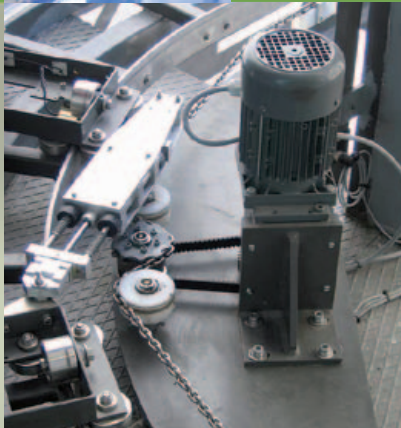
Tyre Protection Chains

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 and surface technology 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.



Milestones in RUD power plant technology

1875: RUD established

1965: First RUD 40 cG quality round steel chain

1985: First RUD Super 35 quality round steel chain

2008: First dry de-asher with RUD chains

2012: First Biogas-Feeder

1951: RUD: world's first case-hardened, round steel chain

1957: First RUD chain for deasher

1992: First RUD apron conveyor

2007: RUD FORKY forked chain

2010: RUD CRATOS



CRATOS® – reliable conveyor systems with continuous full service

Fossil-fired power plants will have to continue making a major contribution to the world's future energy supply. Power plant operators bear a correspondingly very high, permanent responsibility for providing the trouble and fault-free base load energy for electricity and heat.

RUD has been recognised as supplier of drive chain and material handling technologies for the supply and disposal of fossil fuels for decades. As a result, it has developed long-lasting conveyor systems that perform continuously on the battlefield between wear and strength.



RUD has analysed the architecture of many conveyor systems in practical use for possible fault parameters. This has resulted in the development of a conveyor design template system with three key concept modules. RUD systems are engineered and designed to consider critical design calculations, ongoing component maintenance strategies and provide maximum service life to conveyor plant commonly used in fuel feeder conveyor applications and boiler ash handling systems.

The Engineering Concept covers the fields of calculation, planning and consultation.

The Product Concept defines the advantages of RUD round steel chains under demanding conveying conditions.

The Service Concept covers measurement, maintenance/documentation, and installation of the optimal chains and accessory equipment.

RUD calls the overall concept package "CRATOS", after the Ancient Greek god of power. **CRATOS is indeed powerful materials handling technology in continuous full service – for unlimited power.**



Unlimited power – CRATOS® technology for coal fired power plants, waste to energy and biomass energy systems

4

Bulk material transport

Coal-fired power plants

Biomass energy systems

Waste to energy plants

Waste incineration

Special solutions

CRATOS® Conveyor Systems

CRATOS conveyor systems are specifically designed for fuel handling (e.g. coal feeders) and de-ashing applications. CRATOS has system components available that are optimally adapted to the tasks of conveying

coal to the stockpile, and from there to the power plant boilers. The width of the conveyor can range from 0.8 to 1.8 metres. Conventional conveyor speeds lie between 0.1 and 0.3 m/s for non-abrasive material.

Strand conveyors and bunker discharge conveyors are suitable for horizontal and inclined applications with a range of scraper bars and apron options available to provide conveying capacity between 75 and 150 t/h.

CRATOS® Wet De-ashing Systems



© Clyde Bergemann



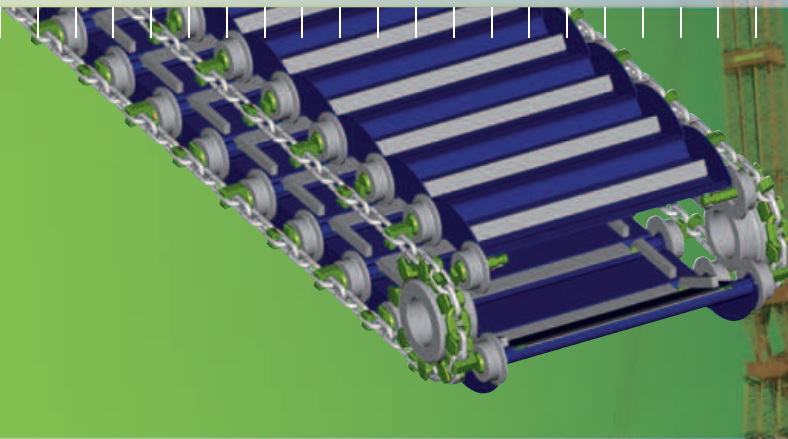
CRATOS equipment forms the heart of a submerged scraper conveyor. Conveying capacities of 50 t/h or more are achieved, depending on the angle of the inclined part of the conveyor. CRATOS chains, chain connectors, drive wheels, guide wheels and scraper bars are highly wear-resistant, optimally heat treated, and self-cleaning in comparison to other systems.

CRATOS® Dry De-ashing Systems

CRATOS® Coal Handling Systems



Conveying task solved – CRATOS® Apron Conveyor Systems



Coal feeding

Bunker discharge conveyor

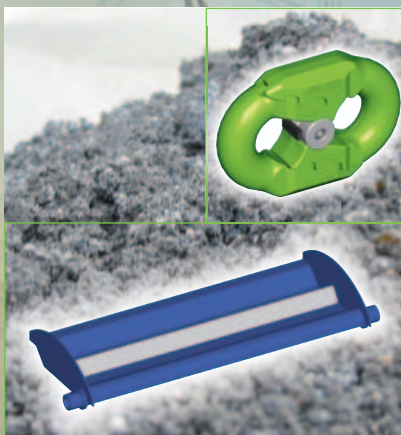
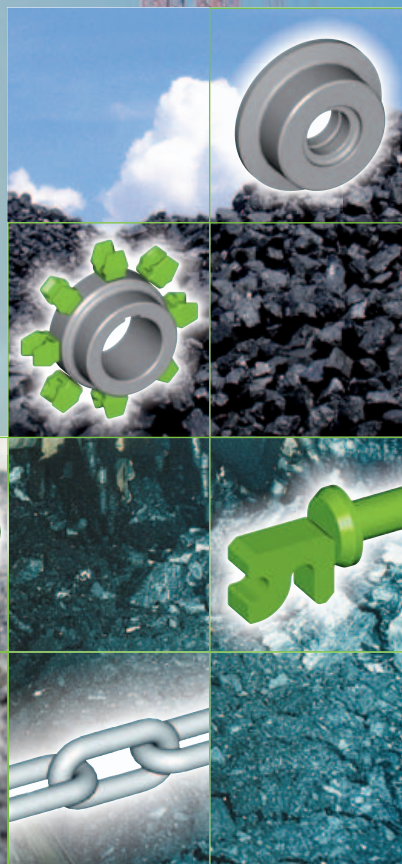
Ash extraction through wet de-ashing- / dry de-ashing systems

Lime handling

CRATOS® Apron Conveyors

Dry de-ashers are a logical, economical further development of de-ashing systems. RUD has designed an apron conveyor system for dry de-ashing based on the CRATOS round steel chain. The ash is now no longer scraped along the floor of the trough, but carried by the plates of the apron. Conveying capacities of 70 t/h or more are achieved, depending on the angle of the inclined part of the conveyor. The designed width of the conveyor is max. 2 m.

- Simple, robust construction with plates of high flexural strength
- Permanently closed apron surface, throughout the entire life cycle
- Short pitch, minor polygon effect
- Lower overall heights can be achieved because of the small chain wheel diameters
- Individual apron plates are closely toleranced
- Accurate calibration of all the system components to offer high efficiency conveying



Always safe in operation

CRATOS® System Components

6

CRATOS Advantage

CRATOS Premium

Phoenix chain

Forked link chain

CRATOS sprocket wheels

CRATOS chain wheels

CRATOS underwater wheels



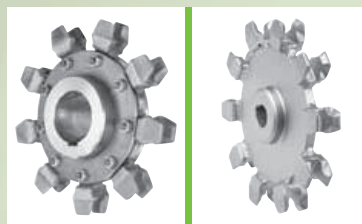
CRATOS® Chains

RUD chains in special quality have exceptional core toughness, which gives them a high breaking strength and resistance to brittle fracture. RUD CRATOS chains are not fatigue critical. The resistance of the chain geometry to the operational stress is always matched to all other system components. This is essential to ensure safe, long-term operational use. The RUD quality strategy is also always leading to new product optimizations, such as reducing the weight of the forked link chain – RUD FORKY.



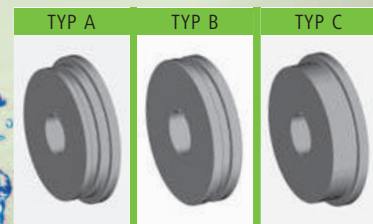
CRATOS® Sprocket Wheels

CRATOS conveyor systems use pocket and sprocket wheels. CRATOS one-piece sprocket wheels as well as multipart wheels are case-hardened. Multipart wheels are also available with exchangeable, highly wear-resistant pocket/toothed wheel rims. The geometry and wear resistance of the sprocket wheels is always precisely designed to match the RUD round steel chains they drive.



CRATOS® Chain Wheels

For submerged scraper conveyor systems, great attention is paid to the design of the CRATOS guide and tensioning wheels because their reliable function is crucial to the service life of the chain equipment. The contact surfaces are inductively hardened for heavy-duty operational conditions. Type A and B chain wheels are suitable for CRATOS Duomount and SSRF attachments respectively. Type C is designed for CRATOS FM attachments as well as MEET and MEETK.

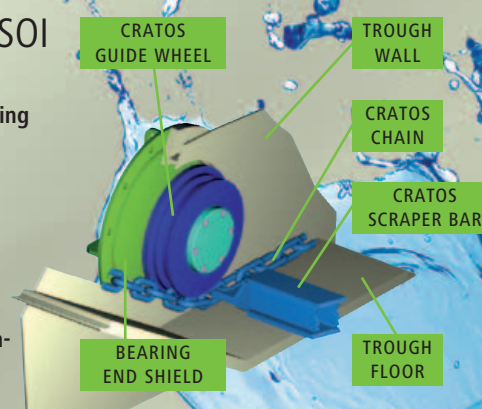


The Innovation: CRATOS® Underwater Wheel SOI

- Ideal for wet de-ashing
- Electronic rotation monitoring
- Mounted on the outside wall of the trough



- For converting old systems
- High-quality, robust, easy-running bearing technology
- Optimized bearing seals
- Easily accessible for maintenance work
- Available in all guide wheel dimensions
- Available with and without bearing end shield

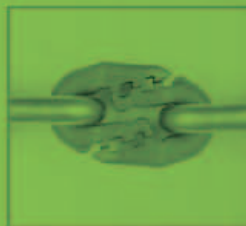


Sustainable High Performance CRATOS® Conveyor Technology from RUD

CRATOS chain connectors



CRATOS attachments



CRATOS scraper bars



Assembly of a RUD flat connector

CRATOS® Connectors

CRATOS chain connectors are highly wear-resistant, hardened and designed for connecting CRATOS chain systems. They are extremely robust, and the industry benchmark. CRATOS chain systems run on pocket and sprocket wheels, as well as on grooved wheels and flat guide wheels. They are suitable for use in single and multistrand conveyors. In accordance with the RUD quality principle, the chain connectors are extremely easy to fit.



60 – 70 % of chain connectors found in the market are derived from RUD patents.

CRATOS® Attachments and Scraper Bars

CRATOS system attachments for submerged scraper conveyors offer you individual problem solving for every application. They are available for smaller to very high conveying capacities. Special attachment systems are also available for driving the plates in apron conveyors and for transporting the material in coal handling plants.

- For heavy-duty conditions
- For double and multistranded conveyor systems.
- Robust and simple
- Easy mounting

DJOMOUNT®



MEE T



SSRF



MEE TK



FM



F



The CRATOS® Product Concept

Advantages and quality comparison *

* System comparison based on the following conditions:
 Application: submerged scraper conveyor
 Axle centre distance: 60 m
 Output: 5000 kg/h during normal operation
 Speed: 0,02 m/s

Products of consistently high quality made by the world's best round steel chain factory.

Optimal, worldwide support from the best experts, with decades of experience.

The CRATOS engineering advantage: Our engineers are measuring, testing and documenting to achieve the highest operational plant safety.

CRATOS components are manufactured in our own production facilities to the highest quality standards.

The unique RUD Portal with „Best Practice Examples“ as references, training documentation, and the „Solution Forum“.

Chain criteria	CRATOS Premium Chain	Mining chain according to DIN 22252	Hardened mining chain	DIN 764 chain ends + case-hardened shackles
Resistance to wear	✓ +++	+	++	++
Durability	✓ +++	+	++	++ because of higher wear volume
Plant availability (safety factor)	✓ +++ Optimal strength and resistance to wear.	++ Tough core – failure through wear.	+	+
Breaking force	++	✓ +++	++	+
Breakage safety factor	✓ +++ Optimal design because strength and wear are taken into account.	+	+	+
Weight of the chain strand (energy efficiency)	✓ +++ 77 kg/m	+	++	+
Price / performance ratio	✓ +++	+	++	+(+) higher material input
Available components	✓ +++ Sprocket- and pocket wheels, single and multiple link attachments	+	+	+

The CRATOS® Engineering Concept Calculation, planning and consulting

CAD data of all standard products available on request

Chain dimensioning and design

CRATOS calculation

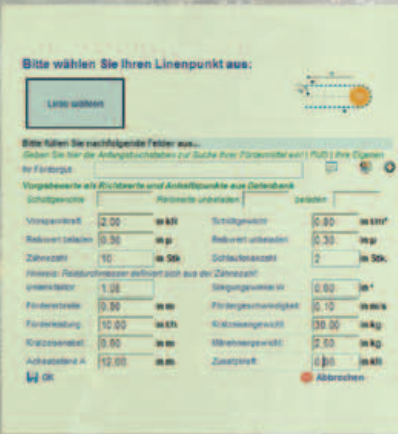
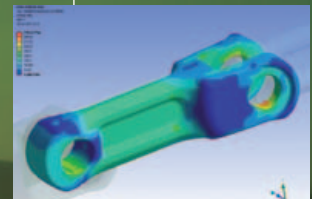
Technical consulting

Product development

CRATOS complete system



The optimal technical solution to meet your requirements!



Your individual CRATOS calculation:

We calculate the right system for you from your specific parameters.

The optimal solution for each material conveyed.

CRATOS® means concentrated technical competence

Each power plant has its own specific conveying conditions. Standard combinations of circumstances cannot be assumed. The CRATOS specialists therefore design individual system solutions for your conveyor plants on the basis of the plant data.



The CRATOS[®] Service Concept

Measuring, documentation and service



On site consultation and inspections available

Measurement and evaluation

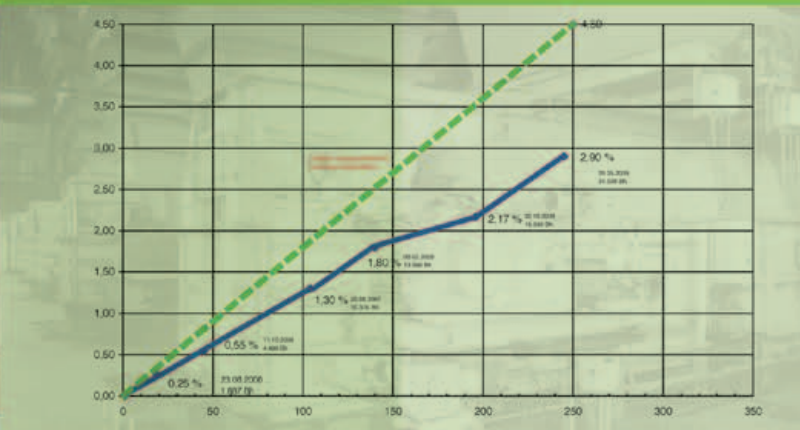
Continuous documentation and analysis

Components manufactured to highest quality standards

On request, components supplied ready for fitting

Component replacement

The CRATOS[®] graph for reliable plant technology



CRATOS[®] Full Service

CRATOS service technicians monitor the supported conveyor systems at specified intervals, measure wear regularly, and submit a spare part offer in good time when required. On request, wearing parts are replaced by CRATOS technicians. Documentation and planning of maintenance is another aspect of the CRATOS Full Service.

RUD Portal

The RUD Portal - exclusively for you at www.rud.com:

- Latest information
- Best Practice Examples
- RUD Solutions Forum
- And many more applications



TRADITION IN LEADERSHIP
RUD NEWS CENTER
 As a dynamic and innovative firm, we give you here the latest news of all divisions.
 News of the RUD Group SA

JOB AND CAREER PORTAL OF THE RUD GROUP
 As the official "Hidden Champion of the 21st century" and "Top 100 Innovator" we offer you the direct route to the portal for our human resources.
 HR - Job & Career Portal SA

CRATOS® – Drive and conveyor technology for energy generation – at a glance

Drag chain conveyors

Screw conveyors

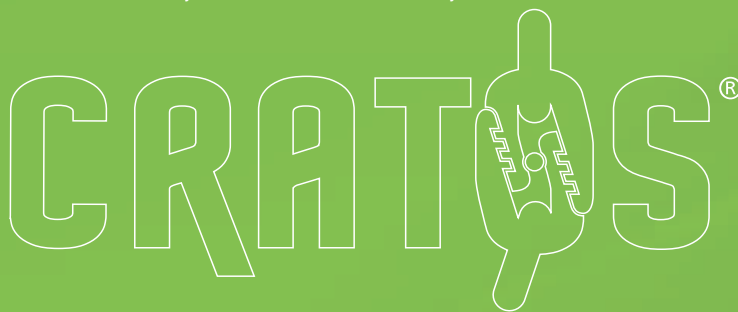
Scraper conveyors

Bucket elevators

Drive systems

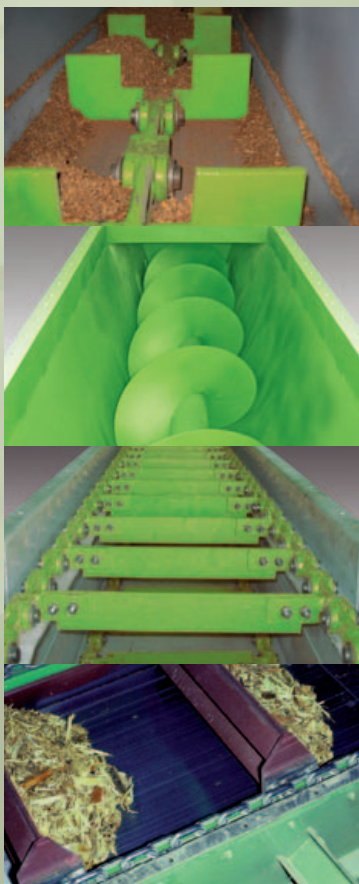
Biogas substrate feeders

De-ashing systems



Conveyor systems

CRATOS conveyor systems offer you optimum solutions for your conveying task. We design and manufacture complete drag chain conveyors, screw conveyors and scraper conveyors. Our conveyor systems are optimally adapted to the tasks of conveying fuel to the stockpile and from there to the power plant boilers. CRATOS conveyor systems are robust and perfectly suited to the conditions in coal-fired power plants.



Bucket elevators

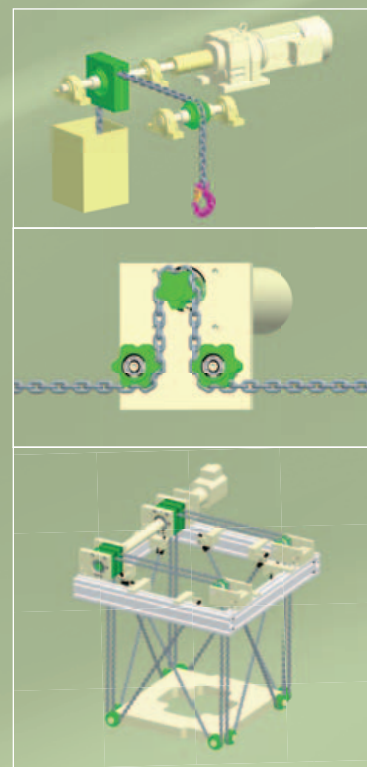
CRATOS offers you complete bucket elevator systems that cover everything from the calculation phase to long-term maintenance of components. Whether you need a round steel chain, central chain, or belt – we will solve your conveyance challenge.



Through our long-standing experience in the fields of de-ashing, biomass and coal combustion, as well as recycling and waste management, our components and systems are perfectly suited for each other.

Drive systems

CRATOS Drive systems offer you optimum solutions for diverse transmission challenges. Based on the round steel chain as traction unit, we design and manufacture a big range of different drive systems either for lifting, driving or conveying applications. Whether you need to adjust stock doors, move big sliding doors or lift up cargo elevators, our drive systems are robust and will solve every transmission challenge.





www.rud-cratos.com

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 - Military technology
 - Hoist chains
 - Drive technology
 - Tyre protection chains
 - Snow chains
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