

Alumina and Aluminium



We know how

alumina technik

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Since its founding in 1906, Claudius Peters has become one of the world's most respected engineering houses and an innovative world leader. Its German engineering excellence continues to set benchmarks for the design, manufacture and commissioning of materials handling and processing systems for the gypsum, cement, coal, alumina, steel and other bulk-handling industries.

From conception and installation through to commissioning and after-sales support, Claudius Peters provides world-class service to the world's biggest bulk materials producers.

The Claudius Peters Group GmbH is headquartered in Buxtehude near Hamburg, Germany, with regional offices in the Americas, Asia and Europe.





Claudius Peters' headquarters, Buxtehude, Germany.



Alumina refinery and smelter in Northern Germany.





Technikum

The Claudius Peters Technical Center is a state-of-the-art facility, offering clients the facility to laboratory test any bulk solid conveying system.

Extensive testing, backed by years of experience, enables Claudius Peters to design and produce conveying and handling systems that combine high reliability with minimal power consumption.

Incorporating lines up to 5 km and an extensive range of pipe diameters, the laboratory allows for the design and supply of systems calculated for optimum process, cost and operating parameters. In the Technikum, conveying procedures can be tested for any load, gas velocity, conveying pressure and conveying distance.

Each material is measured for deaeration time, density, humidity and wall friction angle, with data documented in a test report supported by EDP and used to ensure optimal plant design. State-of-the-art technology to meet any conveying and handling requirement

Specific Technologies include:

Storage Solutions

- Anti-Segregation System
- Homogenizing
- Pot Feeding Solutions
- Aerated Distribution System
- Additive Handling

Petcoke Grinding

Claudius Peters EM Mill

Conveying and Handling Solutions

- Airlift
- Pressure Vessel
- Loading and Unloading
- FLUIDCON conveying



Claudius Peters Technikum.



pneumatic conveying

Thorough testing delivers optimal power efficiency



Claudius Peters Airlift.

High-efficiency, low-maintenance pneumatic conveying systems designed to meet any plant requirement.

Materials handling: a clean process

Claudius Peters designs and builds, lowmaintenance, environment-friendly systems for any vertical or horizontal transport requirement, from in-plant systems to ship, wagon and truck loading and unloading, incorporating conveying distances up to 5,000 metres.

Claudius Peters X-Pump

- Space saving design
- Engineered for abrasive materials
- Flexible conveying directions
- ATEX certified



Pressure Vessel systems

- Customized systems for economic operation
- Large conveying distances up to 5,000m
- Dust free operation
- Low maintenance required



Schematic of transport cycle.



Cross section of X-Pump. For 3D animation go to www.claudiuspeters.com



FLUIDCON

The Claudius Peters FLUIDCON system's unique aeroslide transportation principle delivers pneumatic conveying with considerably lower energy requirements.

FLUIDCON's dense phase system with increased bulk material load can be used to convey any fine bulk solid that can be fluidized with low air velocities, expanding homogeneously during the process. With appropriate pipe routing, it can also substantially reduce power consumption.

- Lower investment cost
- Lower gas and solids velocities
- Lower conveying pressure
- Reduced wear
- Lower power requirement
- Lower installation height
- Simplified material feeding



About FLUIDCON

FLUIDCON is a revolutionary, low-energy pneumatic conveyor pipe technology for low, cost gentle materials handling.

FLUIDCON uses the aeroslide principle to completely or partially fluidize material over the horizontal length of a conveyor pipe. Bulk solids are turned into a fluid state with minimal internal friction, creating optimal conveying conditions which enable the conveyance of materials using minimal differential pressure, through uphill inclines of up to 30 degrees.

Advantages of FLUIDCON

- Gentle materials handling. This is due to very low attrition from low conveying velocities, starting at approximately 2-3m/s and ending at approximately 5-10m/s.
- Reduced operating costs, with substantially less energy consumption compared to conventional pneumatic conveying
- High availability. The system is easily started or restarted, even when solids remain in the conveying line
- Alternative feed systems. With reduction in conveying pressure, Claudius Peters X-pumps can be installed instead of conventional pressure vessels, ensuring savings in height and capital costs

Low conveying velocities resulting in low attrition and low energy requirement



Detail of FLUIDCON pipe.



Schematic of FLUIDCON transport.



material storage solutions

Patented Anti-Segregation System minimizes segregation during filling Minimizing segregation of material is one of the biggest challenges for the alumina industry. The Claudius Peters Anti-Segregation System ensures a constant mix of coarse and fines, during filling or discharge.

The best mix

Claudius Peters produces a complete range of storage solutions for different industries, from small pre hoppers to large capacity silos.

For the alumina industry, careful attention must be paid to minimizing segregation of the material. This can be done during silo filling, or by homogenizing the material at discharge. Claudius Peters provides solutions for either approach.

Anti Segregation System

For alumina, constant grain size distribution is absolutely crucial. Segregation of the alumina



A Claudius Peters Technologies plant in operation: convincing in practice.



During silo feeding via the anti segregation tubes, dust does not stand a chance and segregation is minimized.

Separated coarse and fine grains are inconvenient for the alumina refineries and aluminium smelters alike.



Homogeneous material for highest qualities: the mixture is correct. into fine and coarse particles must be avoided at all costs. The Claudius Peters Anti-Segregation System is the ideal solution for achieving this.

In this system, patented filling tubes positioned around the silo perimeter eliminate turbulence as they transport the material downward. When the material leaves the filling tube, it is dust-free, with coarse and fine particles remaining mixed.

The Claudius Peters Anti-Segregation System can be included in a new installation or integrated during plant modification.

- Minimized segregation
- Storage capacity up to 100,000t
- Feeding capacity up to 1,500t/h
- Discharge capacity up to 2,400t/h
- Residual discharge >99% possible



Approx 90% of the silo volume is filled via anti-segregation tubes at the silo perimeter. For the remaining 10%, additional, centrally arranged filling devices are used.



homogenizing

For further optimizing of material quality, Claudius Peters expansion chamber technology provides the ideal solution, resulting in homogeneous material with further reduction of segregation.

Homogenizing with Expansion Chamber Technology

Claudius Peters expansion chamber provides homogenization processes to optimize material quality even further.

The expansion chamber controls aeration and blends of various layers within the chamber. These layers are mixed under the ring channel or under a central cone, where material is relieved from the material load outside the expansion chamber area.



This illustration shows the controlled aeration,

expansion chamber ring and the material outlet.

Expansion chamber homogenizing technology for optimized material quality

Homogenous material quality and less segregation leads to:

- Reduced anode effects
- Less GHG emission
- Improved gas cleaning efficiency





Funnels in the inner and outer area guarantee optimum mixing effects.

aerated distribution system

Safe, reliable and highly efficient alumina distribution from silo to cell The Claudius Peters Aerated Distribution System provides safe and reliable distribution of the alumina to the electrolysis cells at minimal energy demand.

Efficient, safe, reliable materials transport

Requiring minimal aeration air and providing dust-free operation, the Claudius Peters Aerated Distribution System provides safe and reliable transport of alumina, regardless of material quality.

Operating with inclined aeroslides, the ADS system provides safe and reliable operation, regardless of material quality. Any scalings and foreign materials are screened out at the outset, and operation is controlled through aeration of various sections of the aeroslide system. From a central silo near the gas treatment center the alumina has to be transported to the different electrolysis cells. This transport must be:

- Safe and Reliable
- With low maintenance
- Cost efficient
- Environmentally friendly and dust free



Transport from day Silo to potroom.





Safe transport in rough environment.

Control screen.



The ADS system can be used for the transport of alumina and for the transport of Alumina fluoride. Design is completely customizable and is suitable for both greenfield and brownfield installations.

Innovation and know-how to drive efficiency even further





View inside aeroslide.

- Closed supply system from Silo to Cell
- Safe and reliable
- Dust free
- For new installations and modifications
- Excellent monitoring of the operation
- Very low amount of aeration air needed



Distribution alongside potroom.

anode coke grinding

EM Mill

Maintenance-free grinding system with an outstanding service life The Claudius Peters EM Mill is the industry's preferred grinding technology for the production of the petcoke for the anode production.

At the heart of the Claudius Peters grinding system is the EM Mill, which brings the functions of grinding and classifying together into one compact unit.

Material to be ground is fed to the ball ring mill centrally from the top, descending to the rotary grinding yoke. The upper fixed grinding ring, pressed down by the hydraulic system, controls the grinding balls. The calcined petcoke is crushed between the grinding elements and the grinding rings and then transported out of the grinding tack by centrifugal force. Airflow directed upwards captures the ground petcoke, directing it to the integrated classifier.

Any larger particles inside the classifier are then returned for renewed grinding, while other particles leave the mill with the transport gas. The use of a dynamic classifier makes it possible to produce optimum fineness with steepest particle size and distribution lines.



EM Mill grinding elements.





Multiple benefits of EM Mill vertical spindle technology

The introduction of the vertical spindle EM Mill has resulted in dramatic improvement in the consistency and quality of fines for anodes.

Improved Fines Grain Size Distribution

The properties of the fines, characterized by grain size distribution or Blaine Number, can now be maintained with far fewer fluctuations, compared to conventional grinding mills.

Continuous Operation

The capacity of the EM Mill can be turned down from 100% to 25%, avoiding frequent stopping of the mill to meet production requirements. This reduces the amount of grinding loss and improves overall efficiency.

Investment costs

Due to its compact design and the lower noise level, the size of building required to house the grinding plant is relatively small, and noise protection requirements are also far fewer compared to conventional grinding mills. The required silo capacity for the fines is reduced,



EM Mill for anode coke grinding.

which, in turn, leads to a reduction of the segregation in the fines silo and further optimization of the quality of the fines.

Operating Costs

Low specific drive capacity of the total plant and low maintenance requirements combine to keep operating costs low. The grinding balls are designed to last the entire service life of the mill, which further minimizes maintenance requirements and drives down operating costs further still.

Reduction of metallic Impurities

The use of wear-resistant grinding elements reduces the metallic impurities in the fines and therefore in the final aluminium product itself.

Reduced dust emissions

Partial recirculation of the grinding plant's process gas means that total exhaust gas is just the false air produced by individual apparatuses. This means that dust emission released into the atmosphere is always kept to an absolute minimum.

State-of-the-art coke grinding technology – achieving evergreater levels of reliability and energy efficiency



Calcined petcoke grinding plant.



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