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PNEUMATIC CONVEYING  
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**We know how**

**claudiuspeters.com**

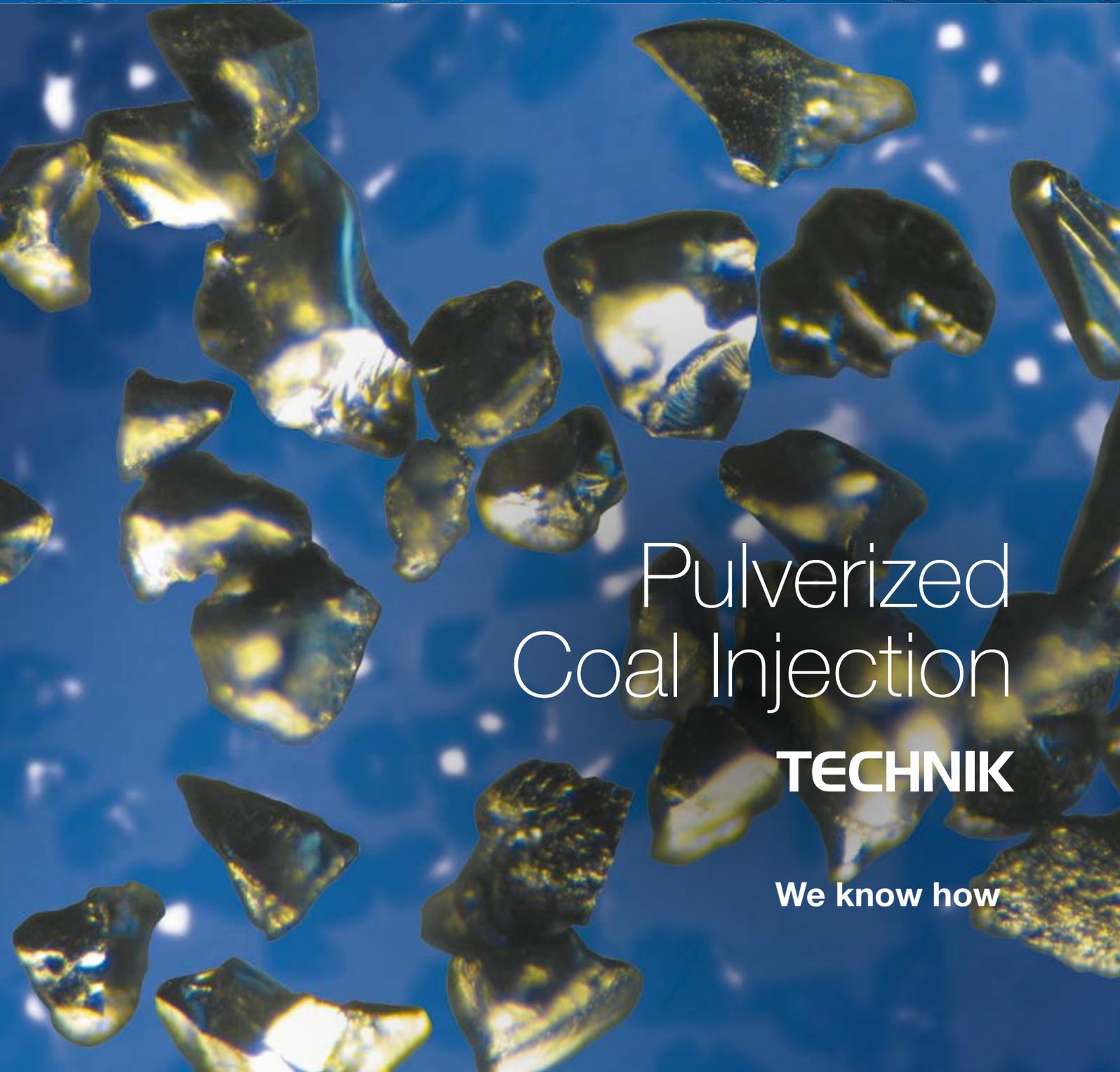
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**CLAUDIUS PETERS**



Pulverized  
Coal Injection

**TECHNIK**

**We know how**

# PCI technik

## About

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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 and 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 iron and steel producers.

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



5000m length of conveying pipes.

### Technikum

The Claudius Peters Technikum (Technical Center) offers clients the advantages of a laboratory for bulk solids and a test facility equipped with all types of conveying systems, with conveying lines up to 5000m in length and a range of pipe diameters.

The Technikum enables the design and supply of systems that are optimally calculated for process, cost and operating parameters. It also allows the testing of different conveying procedures for any load, gas velocity, conveying pressure or conveying distance.

This broad range of tests, backed by years of experience, allows Claudius Peters to design reliable conveying systems with minimal power consumption. Each material examined in the laboratory is documented in a test report where the materials are measured for deaeration time, density, humidity, wall friction angle and other factors. Data is supported by EDP and is used to ensure optimal plant design. Since 1928, we have tested the characteristics of over 14,000 material samples in the Claudius Peters' Technikum (laboratory).



The Claudius Peters Technikum (Technical Center).



Claudius Peters' laboratory.

## Advantages of Pulverized Coal Injection

### Replacement of coke charge

The target for new PCI installations is to replace up to 40-50 percent of the coke charge with coal injection.

### Reduced fuel costs

Coal is much cheaper than coke. It significantly reduces fuel costs over time and delivers shorter pay back periods on the investment.

### Low investment costs

A coal grinding and injection system also requires less initial investment compared to a coke battery installation. As a result, PCI systems can provide immediate savings on fuel costs.

### Reduced pollution

Coal grinding and injection systems are non-polluting systems. Injecting pulverized coal into a blast furnace reduces the overall pollution made by coke production.

### Increased productivity

Installation of a coal injection system can increase productivity through improved operation of the blast furnace.

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State-of-the-art technology at a moderate investment cost

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PCI plant.



Coal distributor with individual valves.



Coal injection system.

# advanced design

## Reliable components

### 1 Stockyard

Claudius Peters technology for the storage of raw coal includes fully-automatic storage systems for all required stackers and reclaimers.

### 2 Conveying system

Claudius Peters supplies a range of technology solutions for conveying raw coal from storage to grinding and injection plants.

### 3 Inert grinding plant operation

In this closed loop system, gas emitted from the filter is partly re-circulated to the mill inlet, thereby minimizing oxygen within the system and reducing the possibility of coal dust explosions.

### 4 Vertical mill

Vertical roller mills grind, dry and classify coal in a single machine. State of the art design ensures low maintenance costs and reduced energy consumption.

### 5 Coal drying and moisture removal

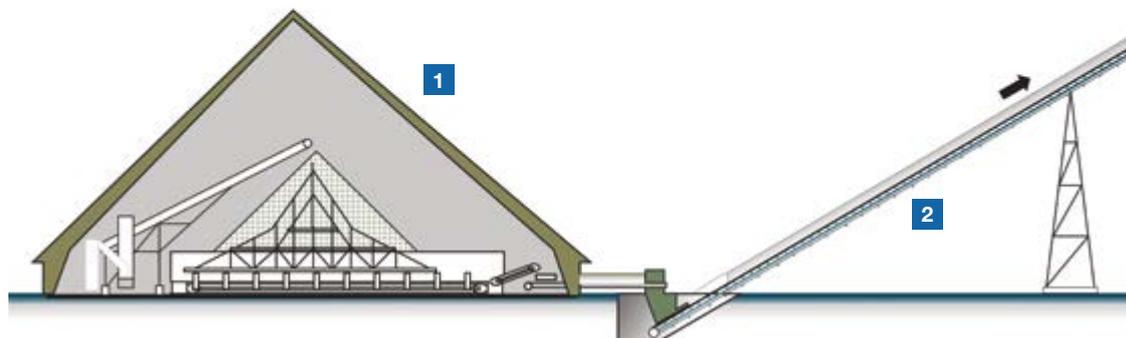
Stove waste gas, when used as an energy source for coal drying, reduces the consumption of primary energy and enables effective removal of moisture from coal, without the need for a gas cooler or condensator.

### 6 Inert operation of the storage silo

Use of the relatively inert gas nitrogen during silo operation helps reduce the risk of fire and dust explosions.

### 7 Weighing system

A precise weighing system, combined with parallel arranged pressure vessels, provides uninterrupted measurement of the coal conveying rate. Fully automated recalibration of the weighing system assures the accuracy of the entire system.



**8 Metering valve**

A metering valve installed in the main conveying line controls the total coal rate.

**9 Dense phase conveying**

Pressurized nitrogen (usually 40 to 50 kg coal per 1 kg transport gas) is used for conveying pulverized coal under dense phase conditions. Low conveying speeds of only a few metres per second reduce wear to a minimum and help extend service life.

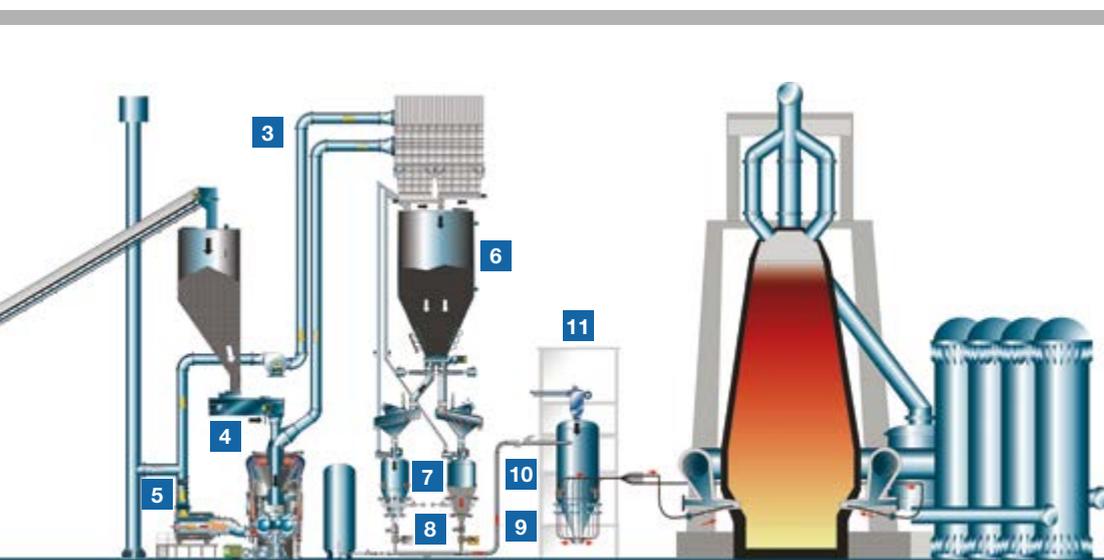
**10 Long conveying distance**

A powerful, long distance pneumatic conveying system can transport pulverized coal between the injection vessels and the blast furnace. Transport injection lines of up to 800 meters have already been supplied and are operating successfully.

**11 Static or dynamic distributor**

Static or dynamic distributors located near the blast furnace provide coal to each tuyere. As distribution in the **static** type is preset, there is no adjustment work involved, which helps reduce maintenance costs.

The **dynamic** distributor allows for control of the blast furnace at the highest injection rates, providing independent control of the coal injection rate to each tuyere, and improved balanced (or unbalanced) distribution.



# technology you can trust

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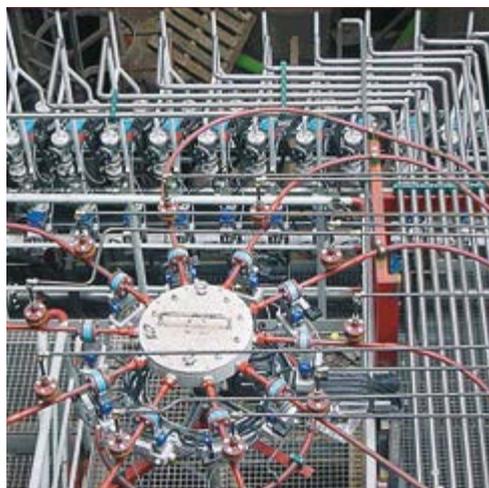
## Experts in coal grinding and pneumatic injection

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Having supplied coal grinding mills since 1906 and injection systems for metallurgical processes since 1970, Claudius Peters has proved itself to be the best partner for this process. The integration of both technologies in 1984 firmly established Claudius Peters as one of the world's leading suppliers of pulverized coal injection systems.

Compared to competing products, Claudius Peters injection systems have proven themselves to be the most effective of all, achieving the highest quality for the lowest investment, maintenance and operating costs. Claudius Peters has extensive experience in coal type usage for blast furnace injection and provides technical assistance for blast furnace operators during commissioning and start-up of injection systems.

With pneumatic injection, optional coaxial lances allow injection of coal through the center tube and additional gas through the annulus. Supplying air through the annulus enhances cooling of the lance tip and this also prolongs the service life of the lance. Oxygen can be supplied through the annulus to enhance the combustion of the coal in the raceway. At very high injection rates, coal injection can be increased if incomplete combustion of coal is causing a 'bottle neck' in the system.



Coal distributor.



Gas control system for oxygen.

The Claudius Peters distributor provides very accurate distribution for minimum investment cost, with negligible maintenance requirement.

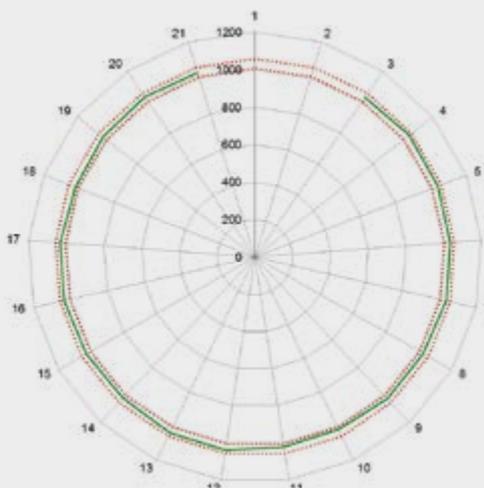
Having proven its suitability at the highest coal injection rates, future modifications and improvements to coal injection technology require the individual measurement and control of coal behind the distributor in order to balance distribution. Further, the injection of individual amounts of coal into each tuyere also become a possibility. The latest state-of-the-art mass measuring instruments and control valves can be installed behind the Claudius Peters distributor for this purpose.



Individual flow measurement.



Individual flow control to each injection lance.



The achieved accuracy in a reference plant is well within +/- 2.5%.