Pulverized Coal Injection

Technik

We know how

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Claudius Peters

About us

Claudius Peters Projects GmbH, Germany and Claudius Peters Technologies SAS, France are part of the Technologies Division of Claudius Peters Group GmbH, headquartered in Buxtehude, near Hamburg, offering technologies in the field of materials handling and processing and providing turnkey or semi-turnkey systems to a wide range of industries. Claudius Peters Group GmbH is a wholly owned subsidiary of Langley Holdings plc, a privately controlled UK engineering group, with regional offices in the Americas, Europe, China and the Far East.

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. Conveying lines up to 800m long with different pipe diameters are available. Our laboratory gives us the capability to design and supply systems which are optimally calculated with regards to process, cost and operating parameters. In the Technikum, different conveying procedures can be tested with any operating condition with regards to loads, gas velocities, conveying pressures and conveying distances. The wide range of tests, backed up by years of experience, allow us to design reliable conveying systems with minimal power consumption. Each material examined in our laboratory is documented in a test report. The materials are measured for deaeration time, density, humidity, wall friction angle, etc. The data is supported by EDP and is used for the optimum design of the plant.
Advantages of Pulverized Coal Injection

Replace Coke Charge

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

Reduced Fuel Costs

Coal is much cheaper than coke, reduces fuel costs and achieves short pay back periods of the investment.

Low Investment Costs

A coal grinding and injection system requires less initial investment costs compared to a coke battery installation. Therefore, investing in coal grinding and injection systems will save fuel costs immediately.

Reduced Pollution

Coal grinding and injection systems are non polluting systems. The overall pollution from coke production for a blast furnace is reduced by injecting pulverized coal.

Increased Productivity

Productivity can be increased with the installation of a coal injection system and accurate operation of the blast furnace.

'state-of-the-art technology at a moderate investment cost'
Advanced system design

1 Inert Operation of the Grinding Plant
In the closed loop system, the emitted gas from the filter is partly re-circulated to the inlet of the mill. This creates an inert condition which minimizes the oxygen content in the system and reduces the chances of coal dust explosions.

2 Vertical Mill
Vertical roller mills provide grinding, drying and classifying of coal in a single machine. The most recent state of the art design ensures low maintenance costs and reduced energy consumption.

3 Coal Drying and Moisture Removal
Stove waste gas plus another fuel gas, if necessary, is used as energy source for coal drying reducing the consumption of primary energy. The moisture of the coal can be removed from the system very effectively without using a gas cooler or condensator.

4 Inert Operation of the Storage Silo
The utilization of inert gas during the operation of the silo reduces the risk of fire and dust explosion.

5 Weighing System
The precise weighing system permits measurement of the injection rate without interruption and the parallel arrangement of the pressure vessels provide continuous flow of the coal into the blast furnace.

6 Metering Valve
The injection rate is controlled by modulating the position of a metering valve mounted at the discharge of each injection vessel.

7 Dense Phase Conveying
Pressurized nitrogen is used for injection of the pulverized coal from the vessel into the transport line. With a small amount of additional transport gas, the pulverized coal is conveyed and injected into the blast furnace under dense phase conditions. In most cases, a loading of 40 to 50 kg coal per 1 kg gas can be achieved in the conveying line.
8 Low Conveying Velocities
The coal is conveyed in the pipeline at a speed of only a few meters per second. This low conveying speed reduces the wear in the pipe to a minimum and provides an extended service life.

9 Long Conveying Distance
This powerful pneumatic conveying system can transport material long distances between the injection vessels and the blast furnace. Additional intermediate receiving hoppers and transport systems are not required.

Transport injection lines with a lengths of 800 meters have already been designed and supplied, and are operating successfully.

10 Static Distributor
A static distributor is located near the blast furnace. It provides the uniform distribution of coal to each tuyere. The distribution is preset by the mechanical design of the distributor and piping, reducing maintenance requirements.

11 Open Automation
Claudius Peters supplies an open automation system for the PCI plant. This design is in accordance with blast furnace control hardware in order to minimize interface problems.
Pulverized coal injection requires two process steps:

- **Coal grinding**
- **Pneumatic injection**

With coal grinding mills being supplied since 1906 and injection systems for metallurgical processes since 1970, Claudius Peters is the best partner for this process. The integration of both technologies in 1984 established Claudius Peters as one of the leading suppliers of pulverized coal injection systems. Claudius Peters injection systems are the most effective when compared to competitive systems. They achieve the highest quality at the lowest investment, maintenance and operating costs. Technical assistance for blast furnace operators is available during commissioning and start-up of the injection system. Claudius Peters has a wide range of experiences in using different coal types for blast furnace injection.

Optional coaxial lances allow the injection of coal through the center tube and additional gas through the annulus. By supplying air through the annulus, the cooling of the lance tip is enhanced and the service life of the lance is prolonged. Oxygen can be supplied through the annulus to enhance the combustion of the coal in the raceway. At very high injection rates, the coal injection can be increased if incomplete combustion of coal is the bottle neck for the system.
The static distributor provides a very accurate distribution at minimum investment costs and maintenance requirements. It has proven its suitability at the highest coal injection rates. Future modifications and improvements of coal injection may require the individual measurement and control of coal behind the distributor to balance the distribution. Also, the injection of individual amounts of coal into each tuyere is a possibility.

The latest state of the art mass measuring instruments have been developed and can be installed behind the distributor for this purpose.

PCI lances at the tuyere level of a 10 000 t/d blast furnace

Individual flow control to each single BF valve

Flow metering device
We know how

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