



Low-NO_x Pulverized Lignite Firing System

Municipal Utilities of Wuppertal, Germany

Power supply with pulverized lignite

Burner capacity:	19 MW pulverized lignite (3050 kg/h) 19 MW natural gas
Control range of pulverized lignite:	1:4, automatic, pressure-surge-protected dosing
Emissions:	CO <50 mg/m ³ NO_x <300 mg/m ³ (without SNCR) SO₂ <200 mg/m ³ (without secondary measures)

Simple, efficient, yet still more economical

Pulverized lignite as an attractive alternative energy source, specifically for midsize industrial companies, is not a new idea. But now SAACKE has made power supply based on pulverized lignite even more economical: A simple modification in the SSB-D swirl burner eliminates the need for secondary measures for NO_x and SO₂ emission reduction. Lower investment costs and significant savings in operating costs add up to an amortization period of less than three years – without having to make any cuts in availability.

Reliable firing with minimum operating costs

Pulverized lignite offers a significant price advantage and stable, long-term supply conditions in comparison to fuel oil and natural gas. Long-term supply is guaranteed and procurement costs are independent of world market prices for mineral oil products with their unpredictable fluctuations. With an organic nitrogen portion of about 0.7 %, conventional combustion of pulverized lignite still results in levels of about 600 mg NO_x/m³. To achieve limit values in the past, it has therefore been necessary to install expensive downstream measures for flue gas treatment such as SNCR or SCR, which mean high investment and operating costs.

Simple structural solution

With the modified SAACKE SSB-D swirl burner and an intelligent staged air guiding system, significantly lower levels of NO_x can be reached – without any secondary measures at all. The burner is fitted with a special dust gun and fires from directly above into a water-tube boiler. The combustion air is supplied as staged air to the burner and furnace.

ADVANTAGES AT A GLANCE

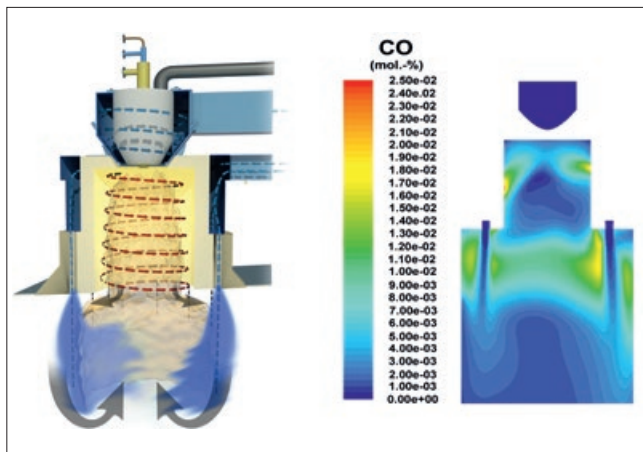
- Pulverized coal firing directly on the boiler
- Multi air injection system
- Outstanding emission values without expensive secondary measures
- Optimum engineering based on simulation calculations without extensive trials
- High availability and efficiency
- Wide control range (1:4) with pulverized lignite

Natural gas is used only as a start-up fuel. It is also possible to achieve full boiler output with natural gas as a low-NO_x firing system.

The 19-MW system developed for the Municipal Utilities of Wuppertal, Germany, is used by wallpaper specialists Erfurt and Son to supply steam for paper production and to generate electrical power with a steam turbine. It achieves a high level of efficiency through combined power and heat with a capacity of 22 metric tons of steam per hour at 48 bar and 450°C.

After the SAACKE solution is installed, the two older boilers previously used for steam production will only be used as redundant boilers that can be added in cases of peak load or when the pulverized lignite system is shut down.

Reliable compliance with the emission limits of the current German Clean Air Act is ensured. Ash content of about 4% caused by fuels is retained in the downstream filter system. The sturdy design is ideal for pulverized fuels and produces a wide, short flame that will fit any combustion chamber geometry. Because the main air has been extensively swirled, the flame is especially stable and provides a wide control range.



Flow principle and CFD simulation

Simulation: cost reductions available quickly

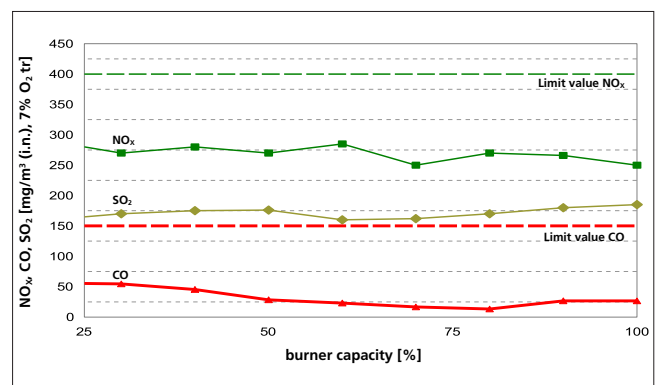
Barely a year passed from the time the order was placed until the plant was commissioned, because the first SAACKE dust burner with direct boiler control was completely computer-based and was entirely developed without trial operation in test systems.

The optimum number and arrangement of air nozzles for optimizing NO_x emissions was calculated by a simulation (the engineering turned out to be very accurate and was fully confirmed by the program developed by researchers from Dresden Technical University and SAACKE engineers). In this way a new burner concept was created and made the leap to practical applications quickly and successfully, without trials or test systems – a true innovation.

Since the combustion chamber supply of the pulverized lignite system is a determining factor for the performance of the system, SAACKE developed a new pressure-surge-protected dosing system, which will also be important for other alternative fuels.

Summary: Thinking ahead

Conversion of the energy supply to domestic lignite offers not only reliable planning, a lower price and simple silo storage, but other advantages as well: The plants feature long maintenance intervals and high availability. Short project run times with experienced partners and rapid return on investment ensure competitiveness. Energy and resource efficiency supports responsible business conduct.



CO, NO_x, SO₂ emission values (limit value SO_x: 1000 mg/m³)

Technical data

Burner type:	SAACKE SSBG-D
Fuel:	Pulverized lignite (RWE), natural gas
Ignition medium:	Natural gas
Burner capacity:	19 MW pulverized lignite (3050 kg/h) 19 MW natural gas
Control range of pulverized lignite:	1:4, automatic, pressuresurge-protected dosing
Capacity of pulverized lignite silo:	480 m ³
Amortization period:	<3 years
Emissions:	CO <50 mg/m ³ NO _x <300 mg/m ³ (without SNCR) SO ₂ <200 mg/m ³ (without secondary measures)

For further information, please visit: www.saacke.com