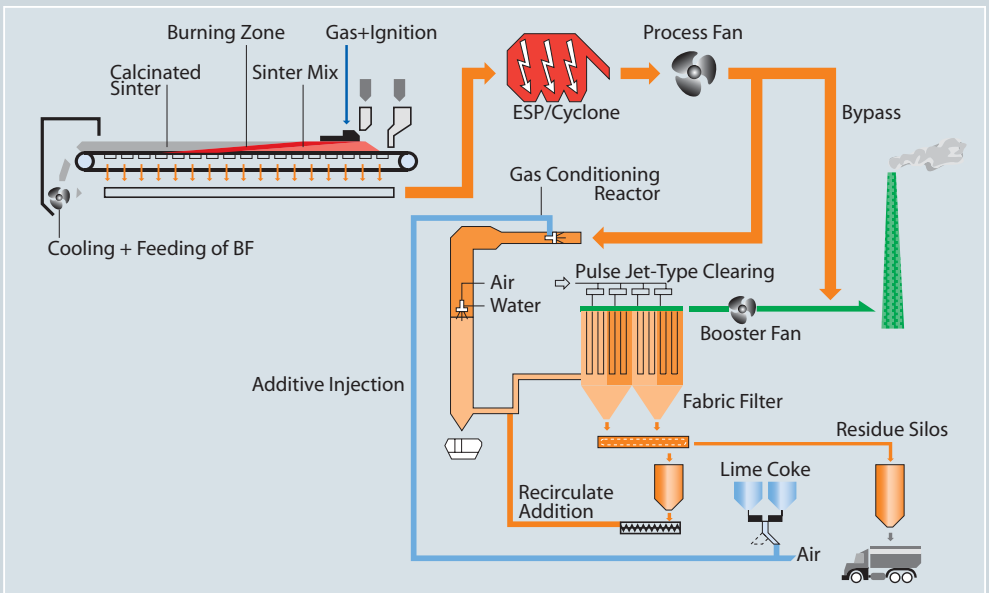
MEROS demonstration plant, voestalpine Stahl, Linz, Austria



Flow sheet of the MEROS process

MEROS – a new dry-type gas cleaning process for the treatment of sinter offgas

Scrubbed Clean

A fully satisfactory, environmentally compatible solution for the treatment of the offgas arising during the sintering process has not existed up until now. In response to this challenge, Siemens VAI recently developed the MEROS® process, which stands for Maximized Emission Reduction Of Sintering. In a series of successive treatment steps, the dust and harmful metallic and organic components present in the sinter offgas are removed to levels previously unattained with conventional gas-treatment techniques. The world's first MEROS plant is currently under construction at the steel works of voestalpine Stahl in Linz, Austria.

The MEROS process scrubs offgas using adsorbents such as specially prepared lignite cokes or activated carbons, and desulphurization agents such as hydrated lime or sodium bicarbonate. These substances are homogeneously injected into the sinter offgas stream at high velocities in the countercurrent flow direction. This binds the heavy metals and organic compounds (dioxins, furans and VOC – volatile organic compounds) as well as the sulfur compounds. In a so-called conditioning reactor cooling and moisturizing of the sinter offgas then takes place using highly efficient dual-flow (water-compressed air) injection nozzles. Chemical reactions for binding and removing sulfur dioxide and other acidic gas components present in the offgas stream are accelerated in this way. Minor amounts of separated substances (stickings, agglomerated material) are removed at the bottom of the conditioning reactor by a conveyor system.

Dust recycling enhances cleansing efficiency

After exiting the conditioning reactor, the dust-laden offgas stream which contains primary dust, additives and reaction products then passes through a pulse-jet-type bag filter comprised of high-performance fabric materials. To avoid penetration of the fine dusts and organic compounds (e.g., oils) into the fabric material, the fabric is coated with a chemical- and temperature-resistant membrane. The dust particles which settle on the membrane surface gradually grow into a filter cake which is periodically removed by a powerful air impulse. The filter cake falls from the cloth surface into a dust-collection hopper.

In order to enhance the gas-cleaning efficiency and to significantly reduce additive costs, most of the separated dust in the bag filter is recycled to the offgas stream after the conditioning reactor. Unreacted adsorbents once again come into contact with the offgas, thus increasing the adsorbent efficiency and reducing the costs for consumables. A portion of this dust is removed from the system and conveyed to intermediate storage silos.

The gas which is exhausted from the bag-filter system by the booster fan is carefully monitored to assure that the prescribed emission values are maintained at all times.

First industrial application

Following a series of test campaigns conducted from 2005–2006, the technical and economical advantages of the MEROS process could be verified. On the basis of these results, the integrated iron and steel producer voestalpine Stahl signed a contract with Siemens VAI in March 2006 for the installation of the world's first MEROS plant at the company works site in Linz, Austria. The new MEROS plant will be capable of treating approximately 1,000,000 m³ of sinter gas per hour, and is scheduled for start-up in August 2007. ■

Main benefits

Unsurpassed cleaning of sinter offgas

Recycling of dust from bag filter to offgas stream for maximum adsorbent efficiency

High degree of flexibility with respect to the use of additives for desulphurization

Meets future environmental demands today

Removal efficiency

Clean-gas dust content:
< 5 mg/Nm³

Heavy metals: > 95 %

Dioxin/furans: Up to 98 %

Acid gases (HCl/HF): > 90 %

Condensable organics (VOC):
Negligible remnant

Degree of desulphurization:
- Hydrated lime: up to 80 %
- Sodium bicarbonate: >90 %

Contact
alexander.fleischanderl@siemens.com