Spray drying absorption

Economic solutions for the iron & steel industry -
Flue gas desulphurization

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A simple process

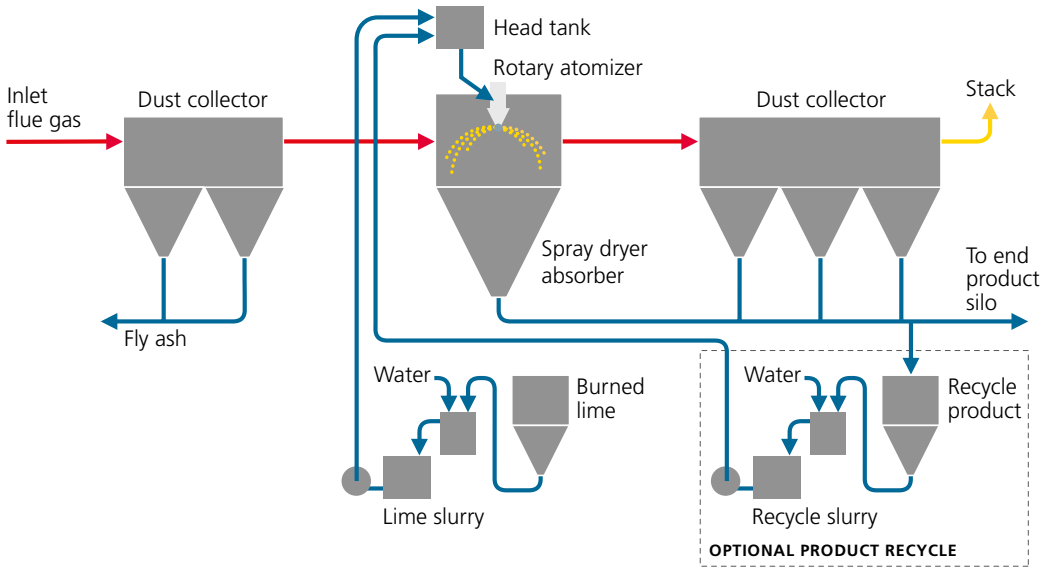
Spray drying absorption (SDA) is based on a simple concept, improved over the years into a precise, effective system.

Hot, untreated flue gas is fed into a spray drying absorption chamber and immediately comes into contact with a fine spray of alkaline slurry (usually slaked lime). Virtually all acidic components in the flue gas are absorbed into the alkaline droplets, while water is evaporated simultaneously.

Precise control of the gas distribution, slurry flow rate and droplet size ensures that all droplets are converted into a fine powder. Some fly ash and reaction products drop to the bottom of the absorber and are discharged.
The treated flue gas continues to a dust collector, where any remaining suspended solids are removed. The cleaned outlet gases are then expelled through the stack, while the dry powder from the absorber- and dust collector bottom is conveyed to a silo.
The SDA process can optionally include a partial recycling of the reaction products to the feed slurry to improve absorption and drying performance. This feature is mandatory for high performance plants.

GEA's unique SDA process offers many advantages. SO_2 removal rates are freely adjustable up to well above 98% and is proven capable of continious operation at 99% removal with SO_2 emissions below 35 mg/Nm³ dry at 16% O_2. In addition, micro-pollutants such as SO_3, Hg, HCl and HF, are also effectively removed during the process.

The SDA is a highly tolerant system, which through a automatic regulation system can self adapt to changes in flue gas flow rate, temperature and composition.
On a practical level, SDA is suitable for sinter plants of all sizes, requiring only a single absorber and a single rotary atomizer for cleaning flue gases from a 600 m² sinter band installation. The absorption chambers are made entirely of mild steel and often produced locally. Furthermore, the process can utilize low-grade water, such as wet scrubber effluent and other wastewater streams, and generates no wastewater.



An overview of the complete GEA Niro SDA flue gas cleaning process. SO_2 is removed by the following principle reaction:
$SO_2 + Ca(OH)_2$ ---> $x\ CaSO_3 / y\ SO_4 + H_2O$

Economical & efficient

A pioneer within SDA

When it comes to flue gas desulphurization, the GEA Niro's spray SDA process can give you an edge. By enhancing efficiency and limiting costs, SDA lets you comfortably balance regulatory and financial ambitions.

First conceived by GEA Niro in the 1970s, SDA has been quickly adopted worldwide by various heavy industries because of its numerous benefits. Originally developed for flue gas cleaning at power stations and waste incinerators, the stricter environmental requirements further conveyed a successful adaptation of the SDA into the iron & steel industry.

It is in the sheer simplicity of SDA that its true merits lie. Using a minimum of equipment and raw materials, SDA requires far less capital expenditure upfront and lower running costs than many rival technologies. All of this means you can meet your commitment to regulators without neglecting your obligation to shareholders.

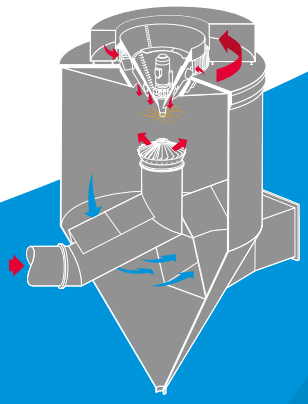
SDA key benefits

- SO_2 removal efficiencies well above 98%
- Superior SO_3 capture rate
- Superior micro-pollutant capture rates
- Low capital expenditure
- Low water consumption
- Low auxiliary power consumption
- Low operating and maintenance costs
- High availability
- Highly flexible: easily adjusts to variations in gas load and composition
- No need to reheat flue gas
- Absorbers made of mild steel – no high alloy materials
- Can use low quality water, incl. waste water or sea water
- No lining required
- No waste water generated
- No sludge treatment equipment required

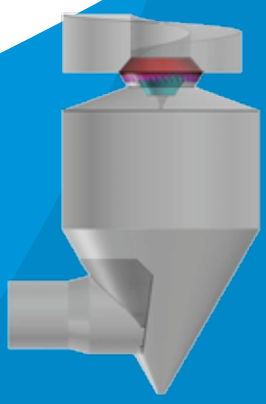
The rotary atomizer and spray dryer absorber

Central to GEA Niro's SDA process is the concept of using a spray dryer as both an absorber and dryer simultaneously. Achieving this relies on two crucial pieces of equipment – the GEA Niro rotary atomizer and gas disperser. The former atomizes feed slurry into billions of droplets, while the latter ensures the correct gas dispersion to optimize drying and reaction conditions.

Years of development and refinement have resulted in a rotary atomizer that is extremely reliable, able to operate continuously for more than 8,000 hours with little maintenance. The absorption chamber has been developed by numerous of CFD simulations resulting in a simpler, lighter and more compact design. From our traditional concept using both central- and roof gas disperser, GEA is now enabling construction of large chambers distributing the total gas flow from the top in one single unit. The efficient mixing allows GEA to reduce residence times and keep a compact chambers design.



The traditional GEA Niro ACP chamber, using both a central- and roof gas disperser to distribute large gas flows.



The GEA Niro AGC chamber, optimized into a lighter, more compact solution able to distribute large gas flows from a single roof gas disperser.

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GEA is one of the largest technology suppliers for food processing and a wide range of other industries. The global group specializes in machinery, plants, as well as process technology and components. GEA provides sustainable solutions for sophisticated production processes in diverse end-user markets and offers a comprehensive service portfolio.

The company is listed on the German MDAX (G1A, WKN 660 200), the STOXX® Europe 600 Index and selected MSCIS Global Sustainability Indexes.

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