Spray drying absorption

Manage ultra-low emissions with
GEA Niro Rotary Atomizers

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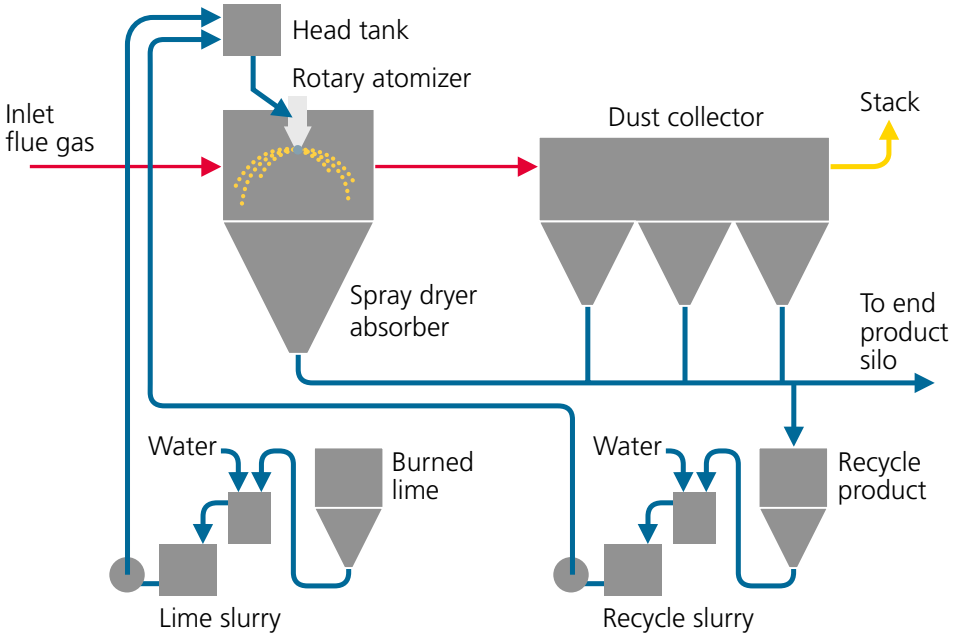
National emission limits of harmful air pollutants are becoming increasingly restrictive in order to improve air quality around the globe. China is seen at the forefront of implementing new legislation and has increased the performance requirements of SO_2 removal down to 35 mg, and in some industrial areas as low as 20 mg/Nm^3 dry @ 16% O_2.

The GEA Niro spray drying absorption (SDA) process, developed in the 70's to reduce harmful emissions of SO_2, HCl, other acid gases, heavy metals and dioxins from power stations, waste incinerators, steel mills etc., are today installed at more than 450 locations around the world.

The rotary atomizer and the absorption process are perfectly capable of reaching the increased requirements on existing and new installations with its versatile design and simple absorption principle. This is enabled by targeted improvement of key equipment and operating parameters when designing or revamping the SDA plants. Even SDA plants designed and constructed for less strict performance many years ago, are today operating in accordance with the new targets, not only in China, but around the world.



Standard GEA Niro SDA process, including recycle system, for ultra-low emissions.

Fynsvaerket power plant, Denmark

Managing ultra-low emissions with automatic process control

At Danish coal-fired power station Fynsvaerket, the GEA Niro SDA process was selected and installed in the year of 1990 to meet the European standards of that time. During the long lifetime of the plant, almost 30 years, the power station has undergone several changes including fuel type, sulfur content, operational demands and stricter emission limits - Always with the same atomizer as a faithful partner.

The SDA process at Fynsvaerket currently reduces the SO2 emission from the power station to levels as low as 10 mg/Nm³ dry @ ref O2 on a continuous basis. This is achieved by monotoring the head tank solid content and recycle chloride content in the automatic outlet temperature control loop. Notably without significant changes to the original design, and still with the original F-800 rotary atomizers commissioned in the year of 1990.

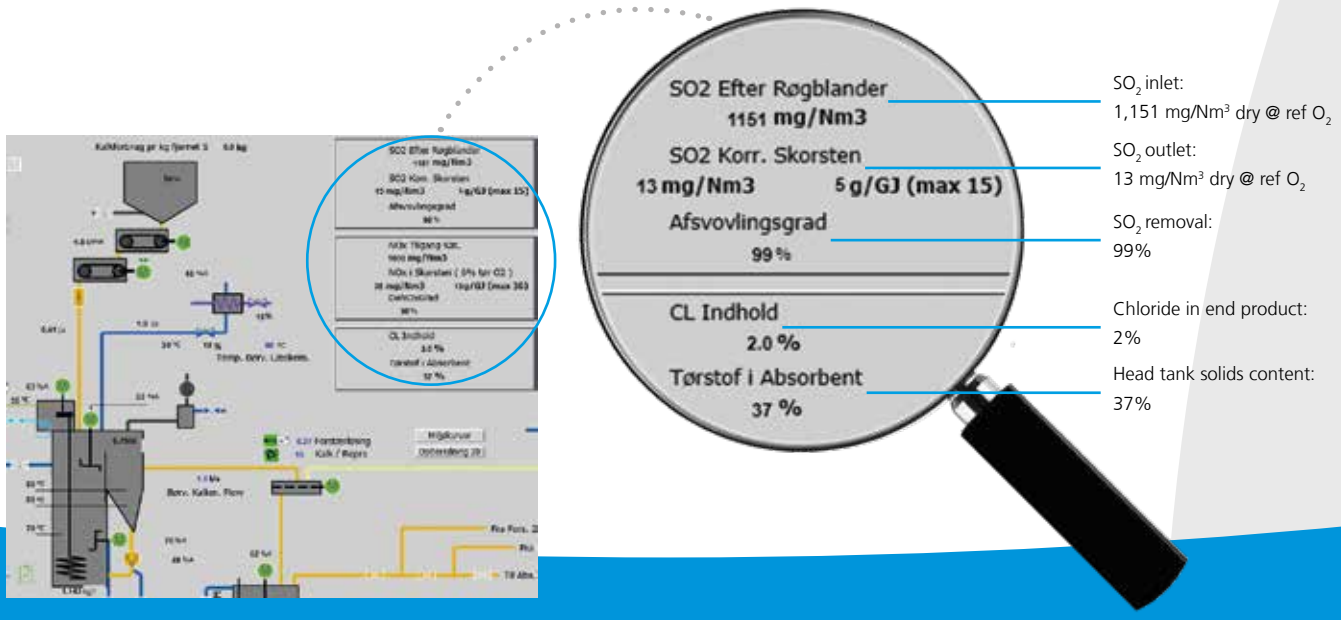
In the figure below, an extract of the online CEMS registration at Fynsvaerket is seen from a visit made in February 2020. The column to the right is a translation of what is seen on the DCS screen. The calculated SO2 removal amounts to 98.9%.

The setting of Fynsvaerken power plant in Odense, Denmark.

Key data and setting

- Boiler size: 350 MWe
- Fuel type: Coal
- Flue gas flow: 1,200,000 Nm³/h
- Year of installation: 1990
- No. of absorbers: 2
- Typical inlet SO2: 800 - 1,400 mg/Nm³ dry @ ref O2
- Outlet SO2 emission: 5 - 20 mg/Nm³ dry @ ref O2
- SO2 removal: 98 - >99 %

Extract of the online CEMS registration at Fynsvaerken. The SO2 emission is controlled to a minimum. Slurry solid content is high, and chloride is monitored through a conductivity meter in the recycle tank.



Large sinter plant, China

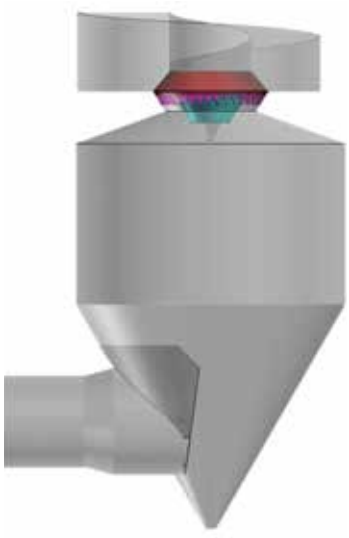
Complied with ultra-low emissions during successful performance optimization

At a large 360 m² sinter plant in Zhangjiagang, the ability and potential of enhanced SDA performance were demonstrated through a series of tests in 2018.

The plant equipped with GEA Niro F800 rotary atomizer and ACP absorption chamber, with roof- and central gas disperser, was commissioned in 2011.

The table summarizes the measurement results, which clearly show that during optimization of operating parameters such as lime slurry preparation and injection, combined with careful control of the outlet temperature, the GEA Niro SDA process achieves a very high performance with ultra-low SO2 emissions - even below 10 mg/Nm³ dry @ 16% O2, with the same atomizer installed.

Parameter	Unit	Test 1	Test 2	Test 3
Flue gas flow	Nm³/h wet	1,510,000	1,302,000	1,213,000
Temperature inlet	°C	152	152	160
Temperature outlet	°C	89.4	89.2	89.6
SO_2 concentration inlet	mg/Nm³ dry @ 16% O_2	807	1,084	878
SO_2 concentration outlet	mg/Nm³ dry @ 16% O_2	**8**	**7**	**5**
SO_2 removal	%	**99.0**	**99.4**	**99.4**



The GEA Niro AGC absorption chamber and DGC roof gas disperser. Our latest and optimized absorber design.

The GEA Niro SDA process is always coupled with the GEA Niro Atomizer

The GEA Niro SDA process is a market leading flue gas cleaning technology, supplied through a selected network of competent and trusted licensees around the world.

GEA Niro F800 rotary atomizer

GEA Denmark
GEA Process Engineering A/S
Gladsaxevej 305
DK-2860 Soeborg

Tel +45 39 54 54 54
Fax +45 39 54 58 00
gea.com/contact