Clearing the air

Nordic Air Filtration reveals how a cement plant in China was helped to reduce its emission levels while preserving production capacity through the use of a pleated bag system.

From the early 2000s, China's cement production has marked an exponential growth and by 2010, its economy had become the second largest in the world, with the country responsible for more than half of global cement production. In the first half of 2020, Chinese cement production was characterised by a sudden decline followed by rapid recovery, and started the first two months of 2021 with a 61% increase from 150 Mt to 241 Mt at one-year distance.

Holes in the bottom of a filter bag.

Installing the pleated bags on site.

Chinese cement plant upgraded with pleated bags

Chinese cement plants often use coal as the main source of fuel, which leads to a significant amount of CO_2 emissions. In general, it takes about 200 kg of coal to produce 1 t of cement which, in 2010, represented 10% of the nation's coal consumption. This puts a lot of pressure on the environment and the health of employees and citizens, and therefore the Chinese government is aiming to minimise emissions levels.

Nordic Air Filtration's client was challenged to reduce emission levels while preserving production capacity. The emission levels were at 28 mg/m^3 and the life cycle of filter bags was only six months. After installing Nordic Air Filtration's pleated bag filter cartridges, emission levels were reduced by 88% – this equates to 3.4 mg/m^3 and the filter cartridges were capable of exceeding the previous lifetime of the filter bags.

At the time, the client was using 3584 traditional filter bags made of polyester media (cloth type). The running time was 3500 hours per year, which means the production was running around 145 days in a year. The total length of the bags was 3.5 m with only about 5000 m^2 of filter cloth per unit. The overall length, construction of the filter bags and long running hours resulted a short life cycle for the bags, lasting only six months.

The client's goal was to lower the emissions levels but also to have a solution that would not cause production costs to skyrocket.

Pleated bags as a solution

Nordic Air Filtration replaced the conventional filter bag system of 3584 filter bags with a pleated bag system that accounts for only 1820 pleated cartridges. This means that the client was able to purchase 1764 fewer units than with the conventional system.

Compared to conventional filter bags that used polyester media, the company's steel version of the pleated bag system was constructed from polyester media with ePTFE membrane, which was much more durable against abrasion.

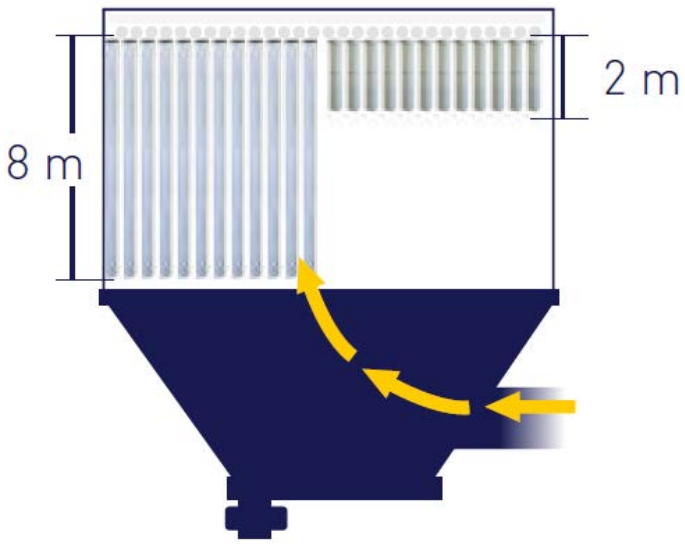
The pleated bags equal 2.2 m in overall length per unit, providing a larger dropout box, which made it possible to utilise the 'gravity filtration' where larger dust particles are separated by gravity without reaching the filters.

Table 1. Introducing the pleated bag system.

Technical details		
	Before	**After**
Airflow in unit	310 000 m^3/hour	
Dust type	Cement, grinding mill	
Collector running hours/year	3500	
Filter model	Filter bag	CPBS - Steel Pleated Bags
Media/cloth type	Polyester	Polyester with ePTFE membrane
Length mm	3500	2200
Number of bags/cartridges	3584	1820
m^2 in each bag/cartridge	1.42	5
m^2 in unit	5090	9100

Furthermore, this released some of the pressure from the filter cartridges and they became more durable against the wear and tear issue on the filter media.

The difference in length between the pleated bags and filter bags.



A 2 m/80 in. pleated bag can substitute an 8 m/320 in. filter bag.

Results

After the instalment and the subsequential inspection, the client was extremely surprised by the result and the conditions they found the filter cartridges in.

The new pleated bag system was able to reduce the emissions levels by 88% equal to 3.4 mg/m^3 down from 28 mg/m^3. The biggest surprise came with the condition of the filter cartridges, which had no holes nor wear and tear in the media after six months. This is a result of the distance between the bottom of the filters and the hopper – the greater the distance, the better the conditions are for the heavier dust particles to be dropped from the airflow before making contact with the filter surface area.

The prolonged filter lifetime allowed the client to reduce the operation time by 20% for the same production capacity and decrease the pressure drop from 2900 Pa to only 1200 Pa. This also meant a huge energy saving on a daily operational basis.

Higher efficiency and economic benefits

Often economic and environmental benefits can be gained by upgrading a filter bag to a pleated bag solution. With Nordic Air Filtration's Total Savings Report based on specific baghouse details, customers receive a full overview of how much a pleated bag solution can:

- Maximise air flow through the baghouse.
- Reduce energy and maintenance costs.
- Maximise the life cycle of filters.
- Lower emissions.

Meeting customer needs

Nordic Air Filtration's flexible production facilities provide the opportunity to customise filters to cater to almost every customer's need and application type:

- Up to 3 m long.
- Fits hole sizes in the range 115 – 208 mm/4.50 – 8.19 in.
- Bottom and top mounting.
- High temperature steel top loader.

Nordic Air Filtration is a high technology filter manufacturer supplying filters for resellers, end-users, and OEMs across the world.

With a range of more than 4000 different filters and 20+ types of high-quality filter medias, the company provides air filtration solutions for various industries and dust types, including abrasive, toxic and explosive dust. Additionally, the company offers customised filter solutions and on-site technical field support. ■