



CAMPULSE GTC OUTPERFORMS COMPETITION

OPTIMIZING CARTRIDGE FILTRATION AT A PAPER MILL

SMURFIT KAPPA - PERFORMANT AND SUSTAINABLE

The Smurfit Kappa paper mill in Roermond produces recycled container board from 100% recovered paper. They process 600,000 tons each year, collecting and recycling more than 25% of the Netherlands annual recovered paper. 2013 winners of two Pulp and Paper International Awards, the mill is committed to sustainability and top performance. Part of this commitment is reflected in Roermond's own powerplant, comprising of 4 Allison 501 KB5 gas turbines used in industrial combined cycle.

OPTIMIZING EFFICIENCY

The first 3 units were installed in 1983 and the fourth in 1987. These units were installed in the early days of cogeneration and helped launch the 501 engine as the workhorse in the 3-5MW cogeneration sector. The 4 gas turbines produce on average 14MWh of power, while the plant current needs average 19MWh. The plant has to rely on the grid for anything they do not produce themselves.

Despite being installed over 30 years ago, the Smurfit Kappa paper mill believes there is plenty of life left in the 501 packages and it's worth investing to maximize their power output. They invested in digital controls and in their air inlet systems. The air inlet system optimization had 2 objectives. First, they planned to retrofit each turbine filter house in order to minimize inlet pressure drop and they equipped each of the four housings with different filters in order to monitor performance and efficiency and select the best possible option.

ENVIRONMENT & INLET SYSTEM TYPE

Roermond is located in the Netherlands at the confluence of the rivers Maas and Roer and has a moderate maritime climate influenced by the North Sea and the warm Gulf Stream. Precipitations are high, with a yearly average of 768mm, but are quite evenly spread, and temperatures average 10 °C. The average PM10¹ concentration is 23 ug/m³ and 15 ug/m³ for PM2.5, thus not a high dust area but the gas turbines have still been supplied with pulse filter systems. Even after the dust cake built up, the sticky nature of the dust rendered the pulse system ineffective.

¹ PM2.5 dust concentration measures the mass of all particles 2.5 microns of diameter and smaller per unit area. PM10 refers to 10 microns and smaller. Source: European Environment Agency database from World Health Organization. Data based on Heerlen, NL.



“SMURFIT KAPPA'S RECYCLED PAPER MILL IN ROERMOND PRODUCES RECYCLED CONTAINER BOARD FROM 100% RECOVERED PAPER. “



CASE STUDY

Power Systems

In extremely dusty environments, a pulse filter system is the right choice. This kind of self-cleaning system allows full continuous operation at a low stable pressure drop. In areas such as Roermond, the low levels of coarse dust can lead to a low system efficiency as there is no dust cake formation. Traditional 2 dimensional surface loading pulse filters, when tested for filter efficiency, start at a low level and

increase efficiency as the filter is loaded with dust. In the field, if the filter doesn't load quickly, it may run at its lowest efficiency for a long period of time.

As a solution, Camfil has introduced the GTC media, a three dimensional media with depth loading properties and a constant high efficiency. The synthetic fibers offer more strength and better performance even under high humidity conditions.

shows they can expect at least 3 years from Camfil HemiPleat™ filters.

In addition, the GTC media offered constant high filtration efficiency (F9 per EN779:2012), thus better protection without any pressure drop or life penalty.

Site data

Total run time	16,000 hours
Median relative humidity (RH)	78.5%
Median temperature	10°C (50°F)

THE RESULTS

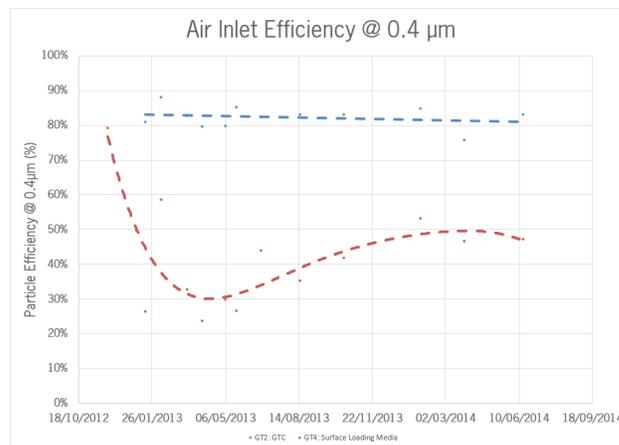
Both Camfil filters with the HemiPleat™ open pleating technology offered constant low pressure drop. Both have consistent flat pressure drop curves over time while the competitive filters showed sharper increase over time. The site typically got 2 years of filter life, but the trend

BENEFITS

- Longer filter life means less shutdowns for filter changes
- Consistent lower pressure drop means a consistent higher power output
- Consistent high efficiency means less fouling, more power output and lower fuel consumption
- Consistent high efficiency and less fouling also means less stops for water washings are needed

Filtration data

	GT2. HemiPleat™ Synthetic GTC	GT4. HemiPleat™ Blended media	GT1. Competitive Filter	GT3. Competitive Filter
dP Increase over test (2 years)	30 Pa	30 Pa	220Pa	370Pa
Filter life	3 years expected	3 years expected	Changed after 2 years	Changed after 2 years
Efficiency at 0.4 um after 2 years	85%	50%	50%	50%
Filter classification per EN779:2012 (Efficiency requirement at 0.4um)	F9 Minimum: 70% Average: ≥95%	F7 Minimum: 35% Average: ≥80%	F7 Minimum 35% Average: ≥80%	F7 Minimum: 35% Average: ≥80%



Efficiency trends illustrate the difference between the GTC 3D¹ media that keeps a stable high efficiency and a typical surface loading media² in a low dust environment. After losing its initial electrostatic charge, it takes several months before the filter starts to regain its efficiency.

1. F9 per EN779:2012
2. F7 per EN779:2012