



OPTIMISED VENTILATION SYSTEM SAVES ENERGY

Fibervisions analysed its ventilation system and installed heat recovery, frequency converters and new controls. The result was significant savings and a better indoor climate.



Fibervisions A/S, Varde

PRODUCTION
Synthetic fibres

INITIATIVE
Heat recovery and demand controlled ventilation

RESULT
Energy savings of 412 of MWh of electricity



Economy

412 MWh

Annual electricity savings

437,000 DKK

Annual savings

79 tonnes

Annual carbon emissions cut

1.3 years

Simple pay back period

The result

- Annual savings of 412 MWh electricity
- Annual cash savings of DKK 437,000 (EUR 59,000)
- Carbon emissions cut by around 79 tonnes

How much did it cost?

The total investment was approx. DKK 700,000 (EUR 93,700). The investment had a simple payback period of 1.3 years including energy subsidies.

Why was the project carried out?

Fibervisions produces synthetic fibres for a large number of uses in industry and in building and construction. Before the refurbishment, the ventilation systems operated at full load throughout the year, and total energy consumption was estimated at 546 MWh per year.

The system operated at two different operational settings:

Normal operation: 80 % recirculation of exhaust air

PET operation: 0 % recirculation of exhaust air

Normal operation was run for 75 % of annual hours and PET operation was run for the remaining hours. These were the original operating settings; however, conditions had changed since the system was first set up.

The analysis revealed problems with jammed damper blades resulting in an actual recirculation rate of only 40 %. This meant that the majority of the air transmitted to the production halls was fresh, cold air that needed to be heated using electric heating surfaces. Fibervisions therefore decided to retrofit the ventilation system.

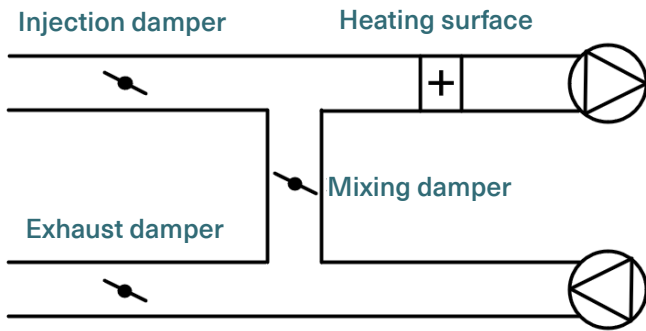


Figure 1 The system, "before"

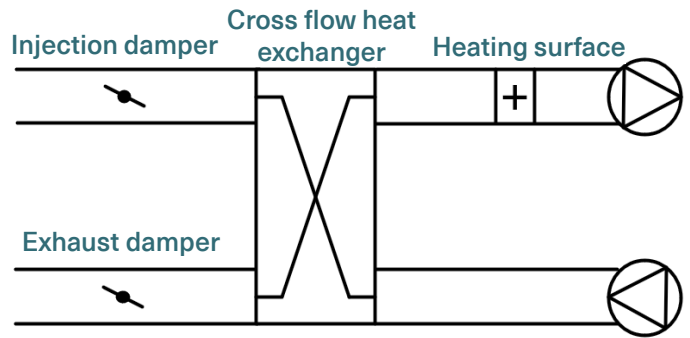


Figure 2 The system, "after"

How was the project carried out?

The primary optimisation effort was to drop recirculation completely and instead add a cross flow heat exchanger for heat recovery. The exchanger has an estimated energy efficiency of 77 %, and considerable savings can therefore be achieved, see figure 2.

In the cross flow heat exchanger, the exhaust air emits heat to the injection air without mixing the air. An energy efficiency of 77 % means that only very little heat (electricity) is needed to raise the temperature to the desired level.

In normal operation, electricity consumption for heating is halved and the indoor climate is improved because now only fresh air is injected into the system. In PET operation, the full saving (77 %) is realised because there was no heat recovery before.

Air volumes reduced

The analysis also looked at the possibility to reduce air volumes. The consultant assessed that air change could be reduced by 25 % and 50 %, respectively, in the two operational settings.

Frequency converters were therefore installed to control the air volume.

Furthermore, ventilation controls were added so that ventilation can now be shut down during the night, and a manual step control was installed to allow production staff to minimise ventilation.

The reduction in air volumes accounts for one-third of the savings, while the new heat recovery solution accounts for two-thirds.

What were the results of the project?

Before refurbishment, the ventilation system consumed 546 MWh of electricity, of which 454 MWh went to heating and 92 MWh went to operate the ventilators. The savings are due to reductions in electricity for heating as well as in electricity used in processes. The total saving is 412 MWh, corresponding to DKK 437,000 (EUR 58,500) annually. Furthermore, it corresponds to an annual saving of 79 tonnes of CO₂.

The total investment was DKK 700,000 (EUR 93,700), of which DKK 500,000 (EUR 66,900) was spent on a cross flow heat exchanger and on mechanical refurbishment, and DKK 200,000 (EUR 26,800) was spent on new controls in the ventilation system. After energy subsidies, there is a simple payback period of 1.3 years.

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