Still plenty air up above
Small interventions, big effects
Optimising pocket ventilation

Exploding energy costs can tear deep holes. But who are we telling this to.
As one of the most energy-intensive industries, you are particularly affected by it.
But there is good news, too: Paper production still has high potential for savings.
Even small optimisations can have a great effect, especially in the dryer section.
You just have to know exactly where and how.

TASK – finding the devil in the detail
This is exactly the knowledge that we possess within TASK. Our experts from Düren are constantly measuring a wide range of paper machines. Always there with us: specially developed diagnostic equipment. This allows us to put the entire process flow of your machine to the test. We have learned from long experience, the devil is in the details. You have to be pretty persistent until you have located and diagnosed the often minute mistake or troublemaker. Directly afterwards, our machine specialists start working on the necessary corrective measures. And of course, we do not leave your side during the implementation.

Pocket ventilation – frequently neglected potential
Where else can the most energy be saved in paper production than where the most energy is actually consumed – in the dryer section. Close to 65 per cent of the total energy requirement is needed here.

One thing our work shows us again and again: The effects are at their most efficient when supply air is fed directly on to the paper web. Any detours through the dryer fabrics or the basement (undercurrent) will reduce the impact. As a result, pocket ventilation is becoming an increasingly important driver of efficiency as far as we are concerned.

On the next page, we have selected four concrete examples from our database for you. They serve to illustrate how pocket ventilation can be modified, and savings potential maximised.

Marcus Neumann (left) and Lars Breuer

task.
Technical Assistance,
Service and Know-how

CUSTOMER EXAMPLE 1

Productivity increase plus 17 per cent
A paper mill produces newsprint at 1,000 m/min. The dryer section was gradually converted from conventional to slalom based on our recommendations. The direct result of this was significantly better runnability and fewer breaks at the same production speed.

As far as pocket ventilation was concerned, however, there was still an undercurrent from the basement. We therefore suggested to the customer that supply air should be re-routed directly into the pockets of the slalom groups, which provided a further boost to efficiency.

Since then, air is directed where it is needed to pick up water vapour from the sheet and transport it effectively away from the pockets. Installation costs were relatively low. The increase in productivity all the more remarkable – close to 17 per cent and thus a considerable increase in turnover for our customer.

CUSTOMER EXAMPLE 2

Plus 14 per cent
The starting position was similar for us with a manufacturer of printing papers (1100 m/min). The air tended to flow past the paper web and therefore failed to contribute 100 per cent to the drying of the sheet.

Our colleagues on site recommended a conversion to blowboxes. The works were rapidly executed and the customer was almost as quick to enjoy a significant increase in productivity: up to 14 per cent. For sure, our TASK team was delighted too.

CUSTOMER EXAMPLE 3

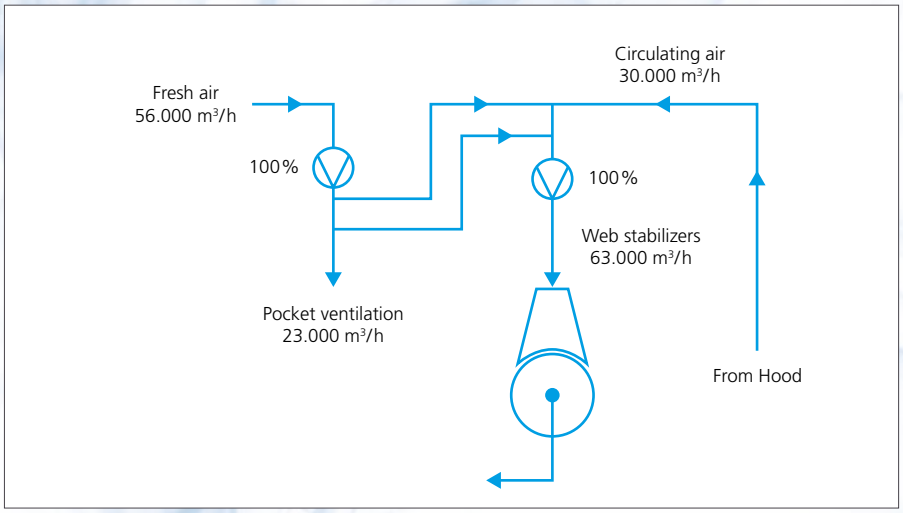
Repositioning
Our third case shows: even a pocket ventilation setup that is functioning well can often produce further significant savings as a result of small improvements. A paper producer (LWC 1300 m/min) asked for our support. After thorough analysis, we recommended that he replace and reposition eight blowboxes. As little as the effort was, the result had a lot to offer:
Steam savings since the modification amount to 40 kilograms per tonne of paper. The annual savings are just under 160.000 Euros. The cost of the eight new blowboxes was just 8.000 Euros. Return on investment was actually achieved within 17 days.
Fair to say, that such examples remain long in the memory.

CUSTOMER EXAMPLE 4

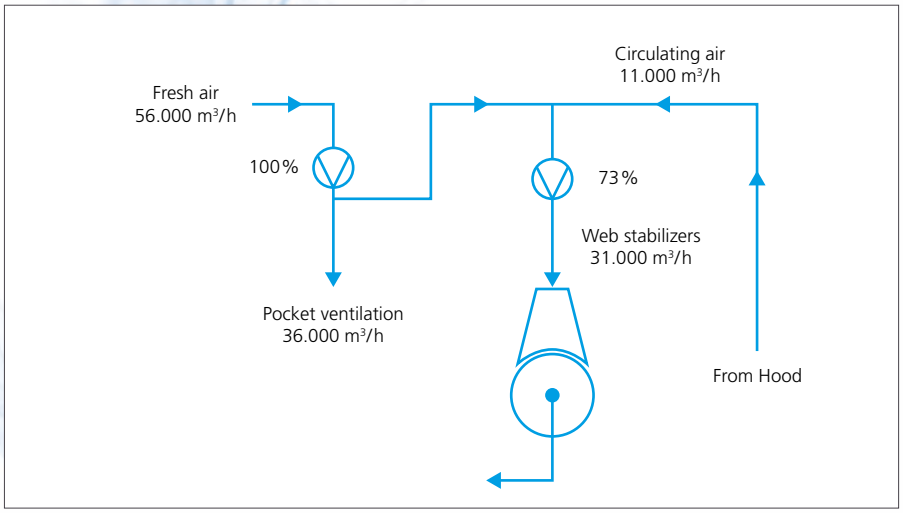
Optimise in the per thousand range
Finally, we would like to highlight worthwhile small improvements on "Formula One" machines. The wider and faster the paper machine, the higher the production and the more rewarding the optimisations. This applies mainly to what we call per thousand machines. One of our customers making newsprint at 1600 m/min complained at the highest level about edge lifting in the slalom groups and bottlenecks in the dryer section. Also seen was creasing at the edges of the sheet in the conventional groups.

Our analysis showed that in general the situation in the dryer section was good. The water load of the pocket air was at a good level. However, a more in-depth look showed:

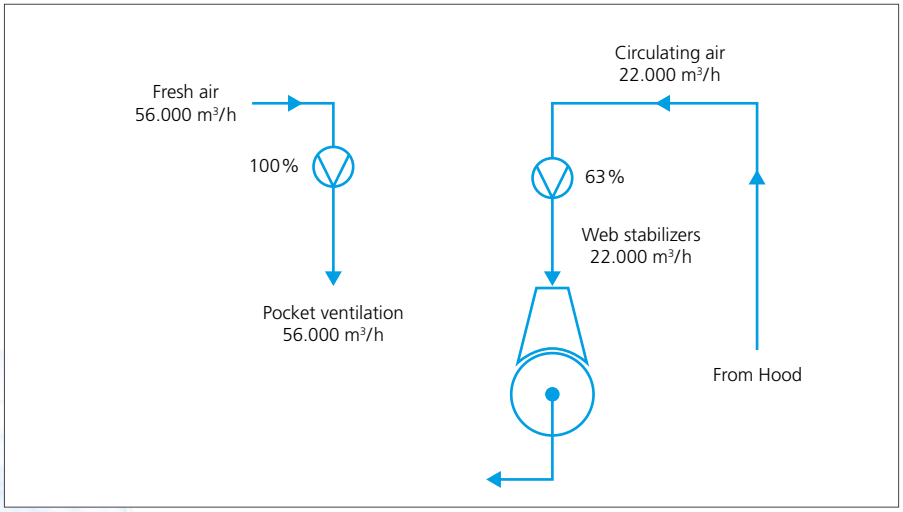
- The stabilizer settings were not perfect – a must on high speed machines. This was an explanation for the edge lifting.
- The air circulation in the pockets was not optimal. A large part of the fresh air supply was being used to stabilize the sheet and was therefore not available as pocket air for evacuation of the evaporated water (Fig 1).
- Opening the last gate of the dryer section during production to prevent drop formation in the hood indicated a shortage of exhaust air.
- The layout of the air ducting was much too complicated. Unnecessary branching caused air to travel longer distances with a resulting loss of energy.



Initial conditions (Fig 1)



Step 1: Fresh air to the stabilizers reduced (Fig 2)



Step 2: Fresh air to the stabilizers turned off (Fig 3)

Phase 1:
Dryer Groups 1 – 4

Actions and Results

- Optimum adjustment of web stabilizers, thus no edge lifting
- Provision of fresh supply air to the stabilizers has been reduced (Fig 1 to 2) and later completely closed (Fig 2 to 3)
- The Hi-Run ventilator runs only with circulating air out of the hood. Power consumption fell from 100 to 63 per cent. Annual savings in the 5-digit range
- The fresh air saved benefits pocket ventilation (Fig 4)

Steps 1 & 2 :
Fresh air to the stabilizers turned off
(Fig 4)

- More supply air for the pocket ventilation, thereby:
- more drying capacity in the cylinder range 8 – 12
- No effect on cylinders 1 – 7, as there is no pocket ventilation.

Step 3:
Expansion of pocket ventilation = Air Doctors installed in pockets 4 – 6 (Fig 5)

+ more supply air in the pockets
+ leads to higher drying capacity in this area

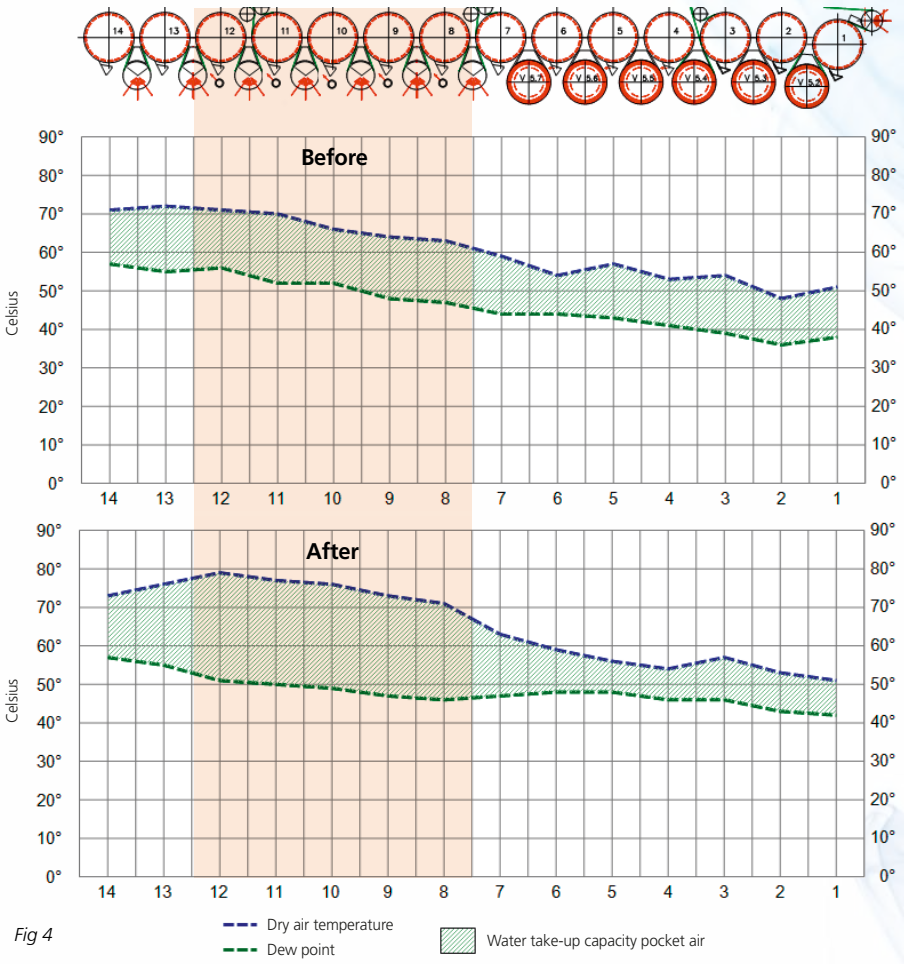


Fig 4

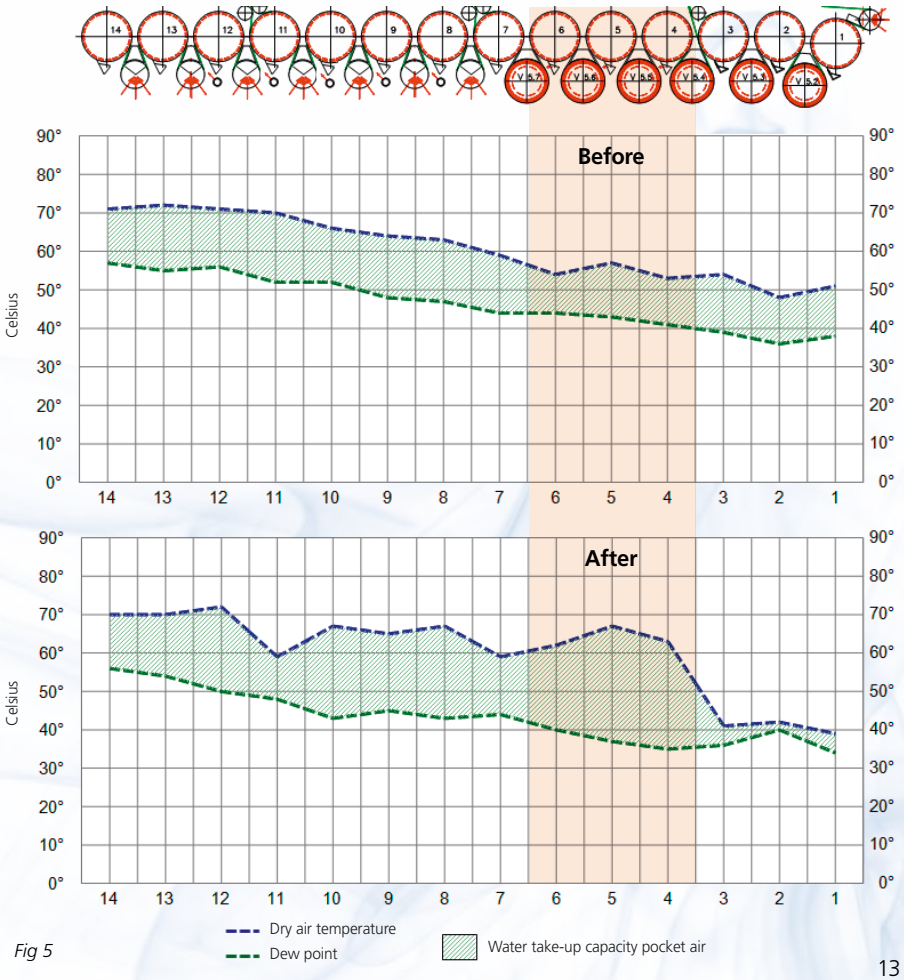


Fig 5

Phase 2:
Dryer Groups 1 – 5

Actions

- Alignment of the blowboxes in the Slalom groups (1 – 4) was optimised.
- Air doctors were fitted in the 5th group (Pockets 18 – 21) and connected to the existing supply air

Results

- further stabilization of the paper web, thereby:
  + Edge creases greatly reduced
  + Scrap due to edge tears reduced from 17 to 7t/year
- more supply air for pocket ventilation (Fig 6) thereby:
  + increased drying capacity
  + more even moisture profile over the web width

With these concrete findings we could rapidly and precisely clear the obstructions to efficient sheet drying.

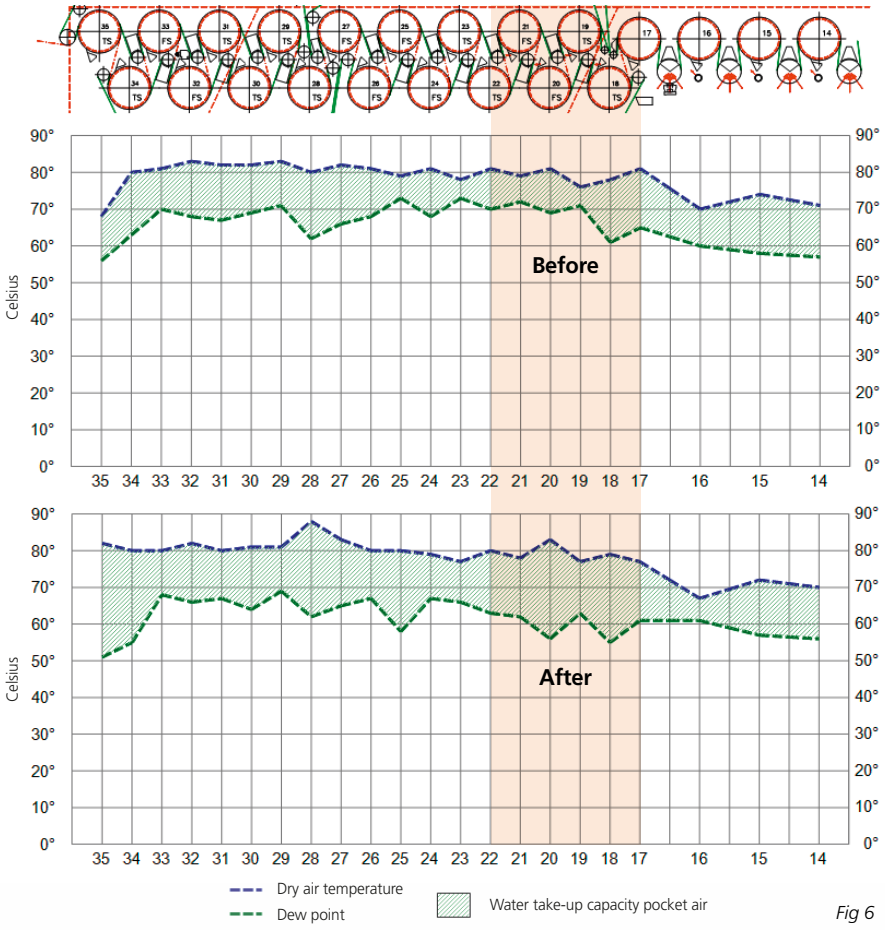


Fig 6

Results of the overall optimisation

- More even moisture profile, thereby:
  + Higher drying capacity
  + Specific steam consumption reduced from 1,16 t steam/t water to 1,12 t steam/t water. This equates to a saving of over 120,000/year* on this machine.
- Stabilization of the sheet, thereby:
  + Edge cracks significantly reduced
  + Production increased by 7,32 t/day, which equates to an annual turnover increase of over 1mio/year.
- Machine speed could be increased by 50 m/min to 1650 m/min.

* - 0,04 t steam/t water
x 20 t water/h evaporation
= - 0,8 t steam/h

- 0,8 t steam/h
x 24 h x 330 d
= - 6.336 t steam/year

- 6.336 t steam/year
x 20 EUR/t steam
= - 126.720 EUR/year

We hope our Case Studies were not too "dry" for you. But small, interesting optimisations in the dryer section, and especially the pocket ventilation, are almost always worthwhile. Whether it's reduced energy consumption, higher efficiency or improved product quality – we are always happy to put your machine under the microscope.

Would you like to learn more?
I am happy to help.

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