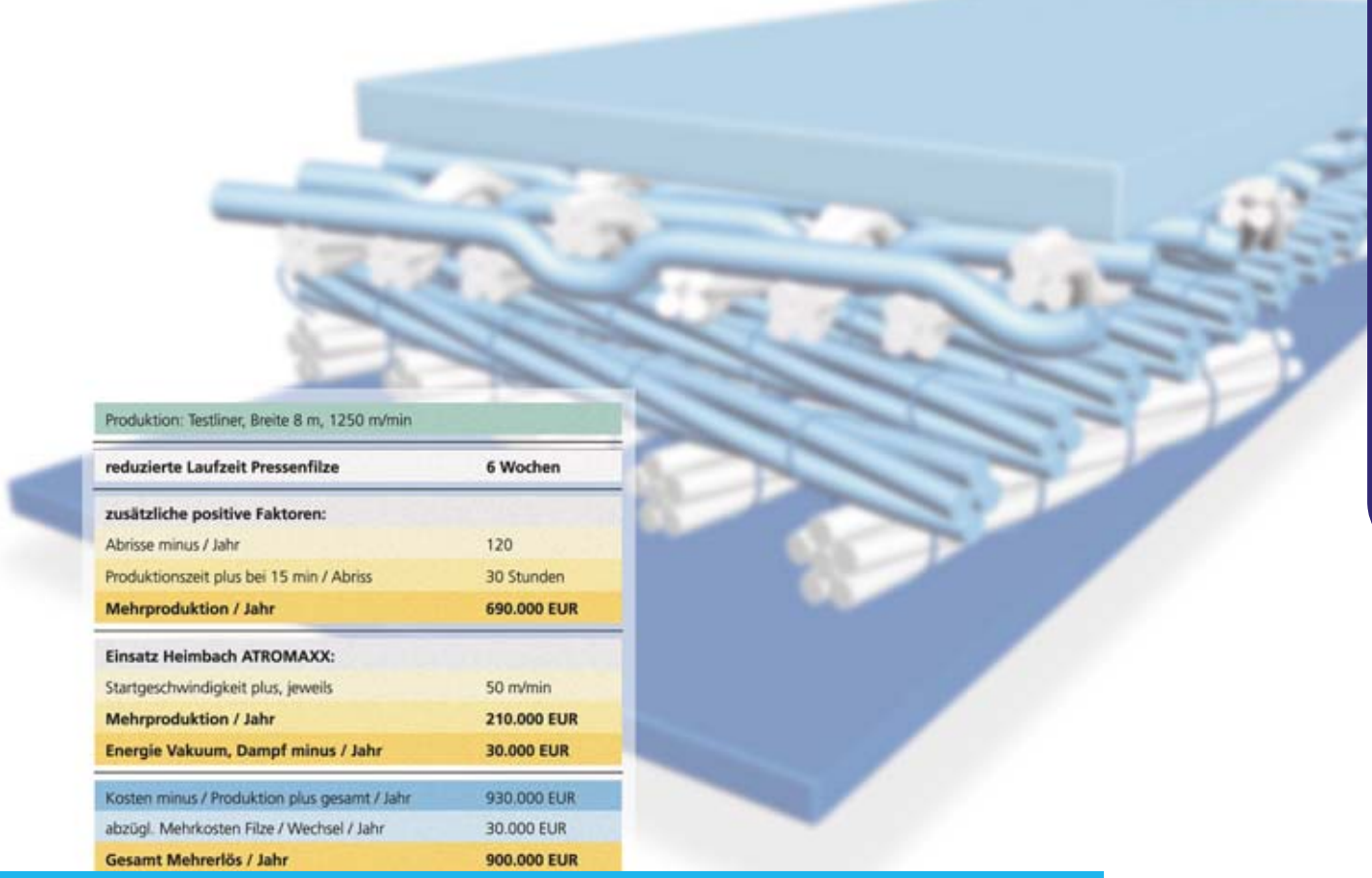

Produktion: Testliner, Breite 8 m, 1250 m/min	
reduzierte Laufzeit Pressenfilze	**6 Wochen**
zusätzliche positive Faktoren:	
Abrisse minus / Jahr	120
Produktionszeit plus bei 15 min / Abriss	30 Stunden
Mehrproduktion / Jahr	**690.000 EUR**
Einsatz Heimbach ATROMAXX:	
Startgeschwindigkeit plus, jeweils	50 m/min
Mehrproduktion / Jahr	**210.000 EUR**
Energie Vakuum, Dampf minus / Jahr	**30.000 EUR**
Kosten minus / Produktion plus gesamt / Jahr	930.000 EUR
abzügl. Mehrkosten Filze / Wechsel / Jahr	30.000 EUR
Gesamt Mehrerlös / Jahr	**900.000 EUR**

Press Release

The current range of Multi-axial Felts from Heimbach: Case studies of Energy Savings

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The current range of Multi-axial Felts from Heimbach: Case studies of Energy Savings

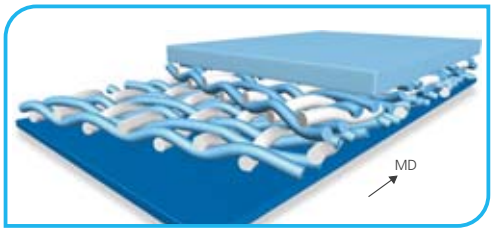
Introduction

Efforts to save energy have involved the entire paper industry and are being applied to all areas of the production process. The following paper is intended primarily to highlight energy related facts in the fields of press dewatering and press clothing. In addition to obvious energy saving possibilities a range of indirect collateral factors are examined.

It is clear that in addition to the ecological advantages of energy saving the economic benefits are more important than ever. The future performance of Heimbach felts is tied to both factors and simultaneously to an optimisation of the production process and an improvement in paper quality. It is also Heimbach's job to develop both aspects successfully on increasingly complex paper machines.

The multi-axial product range ATROMAXX from Heimbach

Its special feature lies in the wide range of variable constructions. ATROMAXX press felts are built on a modular basis. Their base units are composed of either woven and/or compound modules which are aligned multi-axially to one another.

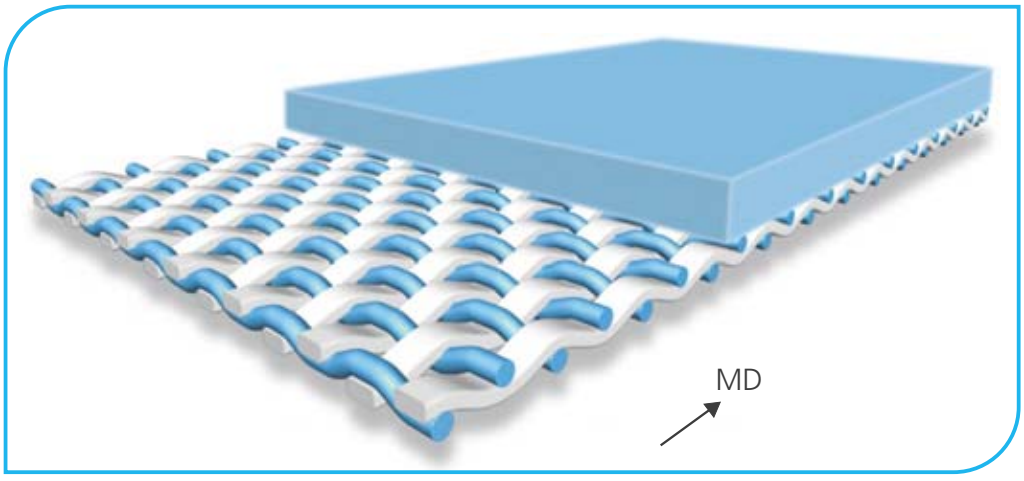


Ill.1 ATROMAXX.M

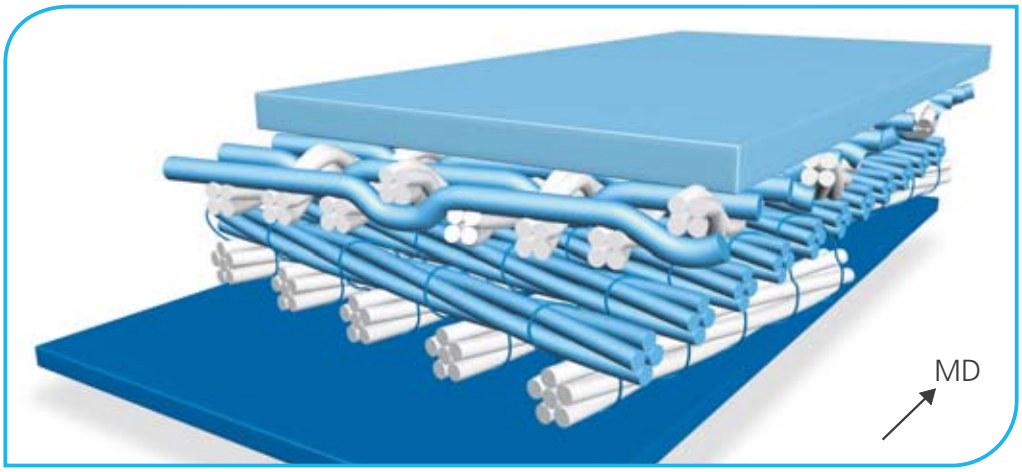
The variety of these base units ranges from the woven pure monofilament construction (Ill.1) via module combinations with fine flat monofilaments (Ill.2) in the paper side base layer (Ill.3) to combinations of twisted / compounded lower base constructions with a woven mono / multifilament upper base layer (Ill.4). There is a similar range of variation with the batt surface modules: Single-layer or multi-layer batts in varying callipers, finenesses and densities can be combined with MD batt orientation (Ill.5) or flat fibre surfaces.

Ill.3 ATROMAXX.XF:
Upper base layer with MD flat yarns

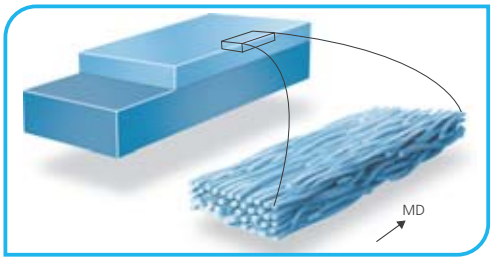
The design of the individual base and surface batt modules and their combinations with one another create the variety of performance characteristics of the whole felt: The degree of batt and base capillarity and thereby the initiation of water flow from the sheet (Ill.6), the amount of void volume, the level of permeability and also the amount of compressibility of batt and/or base to provide resilience.



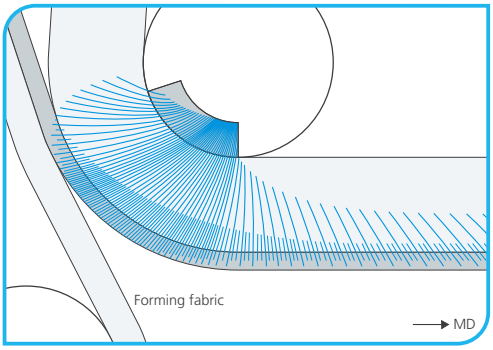
Ill.2 ATROMAXX.XF: Base layer with flat yarns



Ill.4 ATROMAXX



Ill.5 MD batt surface



Ill.6 ATROMAXX:
Initial water flow sheet – pick-up felt

This exceptionally wide range of variation within a single press felt type opens the door to what felt suppliers and paper makers have always wanted: a felt in which individual characteristics and performance can be predetermined and also manufactured.

Heimbach's designers have achieved this: with ATROMAXX press felts which can be matched precisely to the individual demands of nearly any press position. ATROMAXX can truly be described as multi-talented.

Example of basis weight and speed change: For the retention of a high dewatering efficiency in such a case it can be necessary to make a significant adjustment in the relationship between Uhle-box and nip dewatering. One and the same multi-axial felt from Heimbach – subject to its having been designed and manufactured for this feature – can allow for a change in the type of dewatering without any disadvantage.

Without a paper grade change this can, for example, also be applied to a speed increase and improved dewatering efficiency. By establishing the required characteristics in advance a multi-axial felt from Heimbach can be made to perform both for predominantly Uhle-box dewatering and also for predominantly nip dewatering.

Energy facts and costs in the press section

In relation to the total costs of paper production the cost of machine clothing at <1% is insignificant. However, the significance of clothing for the production process, for paper quality and for the current theme of "energy saving", their economic and technical contribution far exceeds the cost question. For this reason it is not the lowest clothing price but its economical efficiency that counts. The felt which best pays for itself – by fulfilling all technological parameters – is the most economical, irrespective of the original purchase price. This case can be made for Heimbach multi-axial felts.

The current range of Multi-axial Felts from Heimbach: Case studies of Energy Savings

Has the "Dogma of Maximum Felt Utilisation" unlimited validity?
Here is a case for calculation.

Clearly, the life of felts is important. It is initially at least the best way of keeping down costs. But is it really worth while to run a felt life to its absolute limits – or even beyond? In most cases it is not. Towards the end of felt life the break frequency increases as the felt is often worn down to the base weave. With reducing dewatering efficiency the sheet leaves the press with a lower dry content, the risk of breaks increases dramatically and steam consumption rises excessively.

Case study on a Testliner Machine at 8 m width and speed of 1250 m/min:

The press felts remain to their limit in the machine and are changed every 8 weeks. Costs for the clothing and necessary shuts amount to 1 million Euro per year. With an average break rate of 60 per month (= approx. 700 per year, each break 15 min at 10,000 Euro per hour downtime) about 1.75 million Euro per year must be added. The total costs for felts, felt changing and downtime through breaks are 2.75 million Euro per year (Ill.7A).

If we now consider the situation where the life of a set of felts is reduced to 6 weeks, more felts and felt changes will be necessary (about 1.33 million Euro per year). However, in this case the break frequency will be reduced from about 60 to only

Production: Testliner, width 8 m, 1250 m/min	
Press felt life: **Status quo**	**8 weeks**
Cost of felts / changes / shuts per year	1.00 million EUR
Number of breaks per year	700
Downtime costs per year	1.75 million EUR
Total costs per year	**2.75 million EUR**

Ill.7A

Life reduction to	**6 weeks**
Cost of felts / changes / shuts per year	1.33 million EUR
Reduction in breaks per year to	580
Reduction in downtime costs per year to	1.45 million EUR
Total costs per year	**2.78 million EUR**
Additional costs per year	**30,000 EUR**

Ill.7B

Ill.7 Cost comparison: Life reduction

about 50 per month for instance – by installing multi-axial "specialist" felts from Heimbach for way of example, obtaining a higher dry content by increased nip dewatering.

The break costs now reduce (ca. 580 breaks per year, each 15 min at 10,000 Euro per hour down-time) to about 1.45 million Euro per year. This means that with a life of only 6 weeks per set of felts the total costs for felts, felt changes and downtime for breaks amount to 2.78 million Euro per year. Therefore the additional cost of a 6 week rather than an 8 week life per set of felts is "only" 30,000 Euro per year (Ill.7B).

These additional costs are however offset by a number of additional positive factors.
Because of the shorter felt lives the downtime for 120 breaks per year is eliminated.

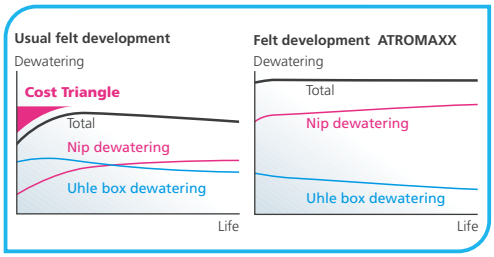
The result is increased production time of 30 hours per year. The sales value of the increased production provides a plus of about 690,000 Euro per year (Ill.8).

With the installation of Heimbach multi-axial felts, which as a rule provide better start-up characteristics (Ill.9), further additional production can be achieved. For example, an increased start-up speed of 50 m/min for one day following every felt change has a value of approx. 210,000 Euro per year.

Furthermore a figure of 30,000 Euro per year can be added for the energy saved – as a result of lower Uhle-box vacuum (Ill.9) – combined with reduced steam consumption resulting from higher total dewatering (Ill.9) and the higher dry content after the 3. press.

Production: Testliner, width 8 m, 1250 m/min	
Reduced press felt life	**6 weeks**
Additional gains:	
Reduced breaks per year	120
Production time gain (15 min/break)	30 hours
Increased production per year	**690,000 EUR**
Installation of Heimbach ATROMAXX:	
Start-up speed plus	50 m/min
Increased production per year	**210,000 EUR**
Energy vacuum, steam reduction per year	**30,000 EUR**
Total cost saving production plus per year	930,000 EUR
less additional felt costs / changes	30,000 EUR
Total increased profit per year	**900,000 EUR**

Ill.8 Planned life reduction: Lower costs, increased profit



Ill.9 Comparison: "Cost Triangle", dewatering

The final result – after subtracting the 30,000 Euro additional cost of changing from 8 week felt life to 6 week felt life (Ill.7B) – is an increased profit of about 900,000 Euro per year (Ill.8) – less material and operational cost of the increased production.

To return to the starting question of "maximum felt utilisation – or not": Despite the planned reduction of felt life from 8 to 6 weeks, process optimisation with the help of high performance multi-axial felts from Heimbach – and additionally both a reduction in costs and an increase in production with significant increase in profit per year – can be obtained.

Advantages for the Energy Balance

Production time gained = 30 hours per year
more energy utilisation of heated dryer cylinders, increased production worth 690,000 Euro per year, plus each start-up at 50 m/min faster for one day = annual increased production worth 210,000 Euro plus full year reduction of vacuum and steam consumption = approx. 30,000 Euro.

Case study Packaging Grades

Position: 3. Press Bottom Felt (Shoe Press). The requirement was for energy saving whilst retaining the effectiveness of the machine.

Under measurement supervision from Heimbach during a short break both bottom felt Uhle-boxes were lowered. A multi-axial felt from Heimbach was already running in this position. As a result of measurements taken after lowering the boxes and further measurements a week later a decision was taken to operate without the boxes as standard.

With further ATROMAXX.M bottom felts (Ill.1) the machine ran uninterrupted for 217 days in 2007 without the two Uhle boxes. At a normal power consumption of the pump of 190 kW a substantial saving of energy and energy costs could be made – quantified in Ill.10 – without any deterioration in machine performance or paper quality.

Runnability without Uhle boxes in this 3. Press could be maintained over the whole life without any diminution of the dewatering performance.

Production: Packaging, width 6 m, av. 1000 m/min	
Vacuum pump energy consumption	190 kW
Vacuum pump shut off for	217 days
Energy saving in 217 days	**989,520 kWh**
Price per kWh	0.04 EUR
Energy cost saving in 217 days	**39,580 EUR**
= Energy cost saving per year	65,000 EUR

Ill.10 Vacuum pump shut off: Energy saving

This was only possible because the multi-axial felts were able by increasing nip dewatering to more than compensate for their removal.

A further advantage of Uhle-box removal was the elimination of the braking effect on the felts over the Uhle-box slots. This brought with it an additional, if lower and unquantifiable energy saving to the roll drives.

Advantages for the Energy Balance
Removal of 2 Uhle-boxes – offset by increased nip dewatering = energy saving from pump of 989,520 kWh = 39,580 Euro in 217 days, according to a saving of about 65,000 Euro per year.

Case study Packaging Grades
Position: Pick-up Felt and Bottom Felt
1. and 2. Press, width 8 m.
This was a very difficult position. The sheet had initially to run with the bottom felt and then transfer into the 3. Press with a long open draw.

The particular problem of the position was that the sheet tended to stick to either the top felt or the bottom felt and when feeding or at breaks to run into the relevant Uhle-boxes. Result: enormous downtime losses for cleaning.

The job for Heimbach with the top and bottom felts always run as pairs was to create a balanced "dewatering relationship" between the two felts so that the sheet no longer stuck to either felt – obviously with the same or even improved dewatering. This sensitive demand was made more difficult by the fact that basis weight changes were likely during the felt life.

With this background the Heimbach specialists from Product Management and TASK selected the highly flexible multi-axial ATROMAXX press felts. First a detailed analysis of the positions supported by measurements was carried out.
Then for the top felt an ATROMAXX.M with 3 pure monofilament base modules had been installed, and for the bottom felt also a monofilament base with 2 modules.

With these very incompressible bases the void volumes for both felts were matched to the available water volumes. The appropriate band width for the distribution of Uhle-box and nip dewatering was controlled by the callipers, finenesses and densities of the compressible batt modules.
The selection of batt surfaces determines the initiation of water flow from the sheet and the degree of sheet following. Establishment of the felt performance values resulted within a usable band width for changing conditions.

On the basis of this variability the differing characteristics of the individual modules created the required behavioural unity of the two felts: the "balanced dewatering relationship" between top and bottom felt.

In practice this "married couple" was able, in addition to optimising sheet control, to achieve also an increase in dewatering and with it a higher speed with the same felt life.

This success confirms the multi-axial module concept from Heimbach also in this difficult position as more than "multi-talented". Further sets of felts were ordered.

Advantages for the Energy Balance
Reliable sheet control in a difficult position, fewer breaks, easier sheet feeding and therefore lower downtime = better energy utilisation of heated dryer cylinders, plus increased dewatering / higher dry content = lower steam consumption or higher production.

Obviously Heimbach have numerous further examples on the subject of "Energy Saving in Press Dewatering and Press Clothing". These will be reported in further papers.

The current range of Multi-axial Felts from Heimbach: Case studies of Energy Savings

Summary

The cases described here indicate the high level of complexity of the energy theme. In addition to the individual comments on energy saving this paper highlights two significant results:

First: Positive answers to questions of reducing energy consumption in the press section are substantially determined by the machine clothing – and by the optimisation of dewatering systems the clothing makes possible.

Second: The energy saving performance made possible by the clothing stands in stark contrast to the cost pressures on the clothing suppliers who make such performance possible. This cost pressure hides the risk that future developments favouring further reductions in energy consumption and costs might be restricted. Heimbach is grateful with this paper to have made a contribution to energy and cost savings.

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