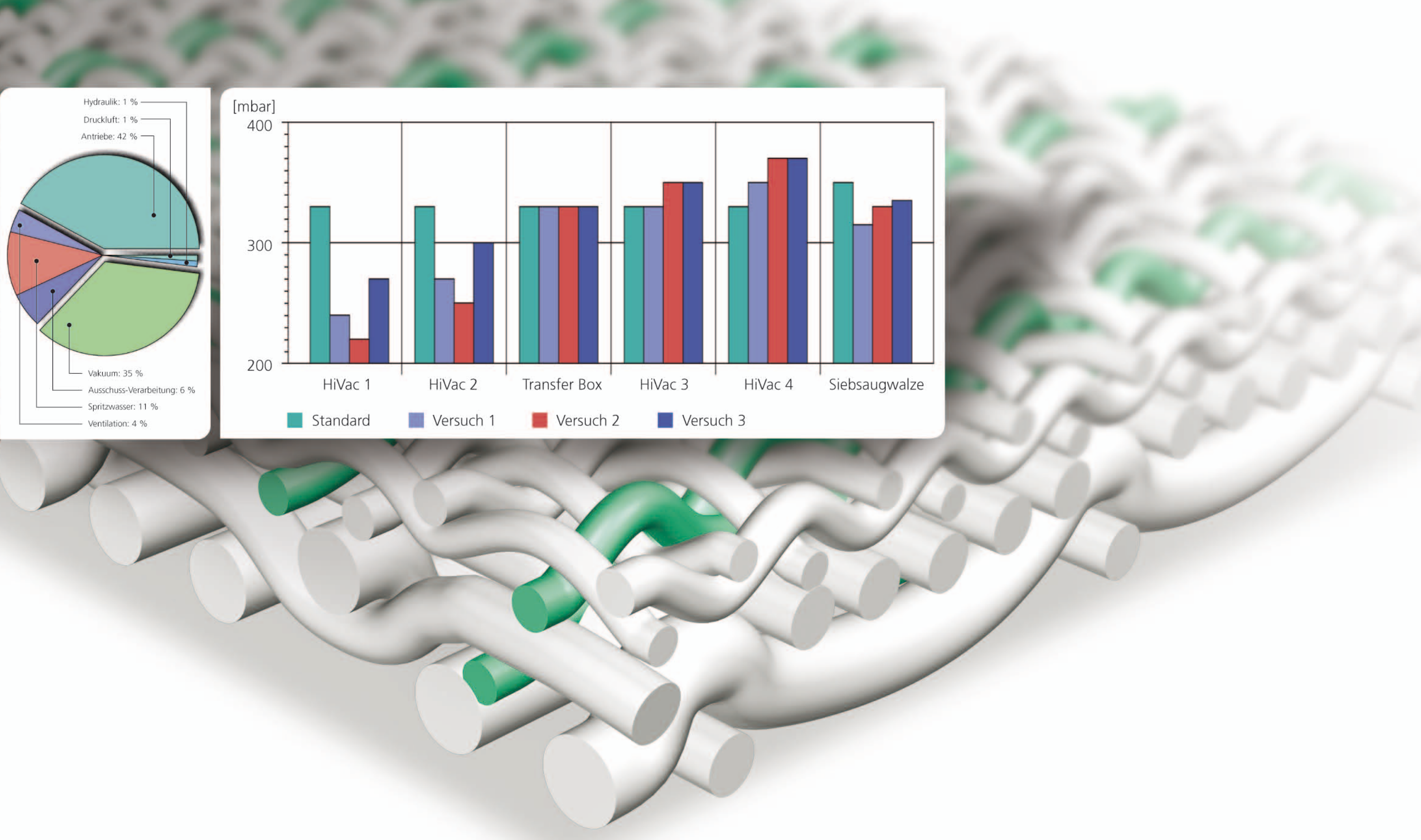

Press Release

Can Forming Fabrics Reduce Power Consumption?

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Can Forming Fabrics Reduce Power Consumption?

With energy expenditure accounting for up to 35 % of total manufacturing costs, pulp and paper producers have always had a strong incentive to improve energy efficiency.

This percentage will obviously vary widely from mill to mill depending on grade, furnish constituents and on integrated vs. non-integrated energy.

In recent times further emphasis has been placed on conserving energy due to the increases in energy costs. Whilst it is an energy-intensive industry, pulp and paper producers have made significant progress in energy conservation over the last years.

Primary energy consumption has been reduced by ~16 % and specific electricity consumption is down by ~11%. The average energy use per tonne of product is now around 16 GJ (Gigajoule) – significantly less than the 24 GJ required in 1990.

Substantial improvements like those highlighted above are the result of investment in combined heat and power (CHP) or co-generation plants, heat exchangers, the introduction of modern and efficient drying hoods as well as improved process technology.

It is commonly accepted that the dryer section of a paper machine is the largest consumer of energy. However, opportunities to optimise and conserve energy in the forming section exist and are often overlooked. Figure 1 highlights the energy used by each section of a typical papermachine.

The majority of energy used in the forming section is based on electrical power. Figure 2 highlights the distribution of electricity consumption in the forming section of a typical Newsprint machine.

Clearly, the areas of focus to save energy in the forming section are in the vacuum and drive systems.

Detailed below are two case studies that demonstrate that it is possible through former and forming fabric optimisation to save energy in the forming section.

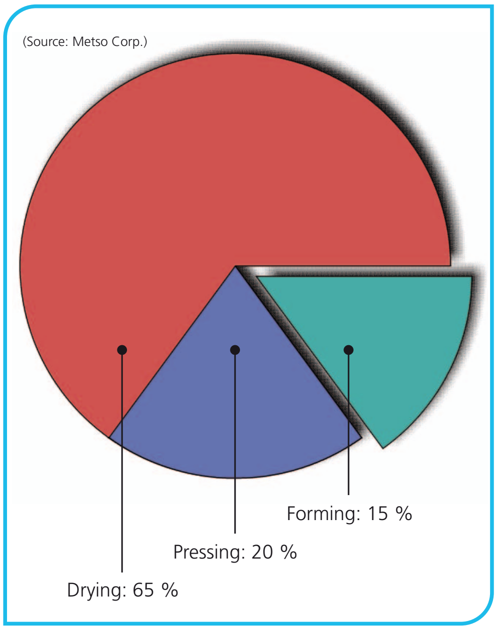

Fig.1 Energy consumption of paper machine

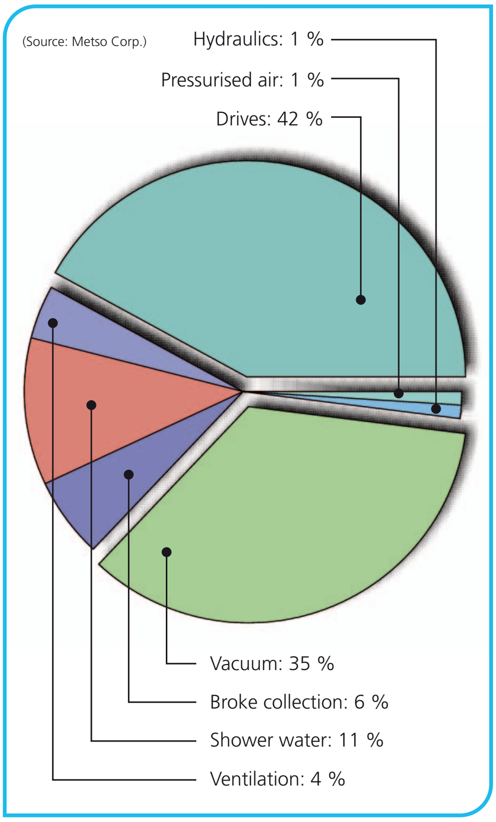

Fig.2 Distribution of electricity consumption in the forming section

Practical Ways to Save Energy in the Forming Section

1. Optimisation of Vacuum Setting

The vacuum regime on all papermachines is one of the key aspects in controlling and optimising the ex-couch dryness. The main task in the forming section after the dryness has reached 5-6 % is to maximise the dry content to the pick-up. The advantages of graduating vacuum can be summarised as follows:

Higher sheet consistency:
Entering the couch at higher consistency improves runnability by presenting an inherently stronger sheet. Less energy is needed in the presses.

Reduction of drag load and increased fabric life:
Since water is gradually being removed over the HiVac units, the fabric is continually lubricated, which reduces dragload and fabric wear.

Improvements in sheet quality:
Graduated vacuum normally reduces pinholes and overall marking, whilst increasing fines/filler retention.

Decreased energy consumption:
Vacuum optimization can reduce overall vacuum requirements and hence energy consumption.

A recent case study is presented below which highlights the significant opportunities to increase dryness ex-couch and reduce energy through vacuum optimisation and reduction.

Case Study Vacuum Setting

The objective of the trial was to optimise the vacuum to gain the maximum increase in dryness whilst keeping the formation at a similar or better level whilst reducing power consumption.

The particular machine (Fig.3) produces SC-A grades at around 1100 m/min. The initial approach was to review the standard vacuum and dryness conditions through on-machine measurements (see "Standard" data points Fig. 4-6). Heimbach specialists then carried out the subsequent changes to the standard vacuum settings, documented in trials 1-3: The initial vacuum (HiVac 1) was reduced and a graduated approach was implemented through the trials (Fig.4) to gain the highest dryness and lowest drive amps. Figures 5 and 6 show the results of the changed vacuum settings.

The best result were achieved in trial 3 where it was possible to reduce the overall vacuum by 2 % (Fig.4) which subsequently reduced the drive power consumption by 6 % (Fig.5). At the same time the pre-couch consistency increased by almost 1% (Fig.6).

These achievements demonstrate that a correctly designed and operated table will reduce power consumption and thus energy costs.

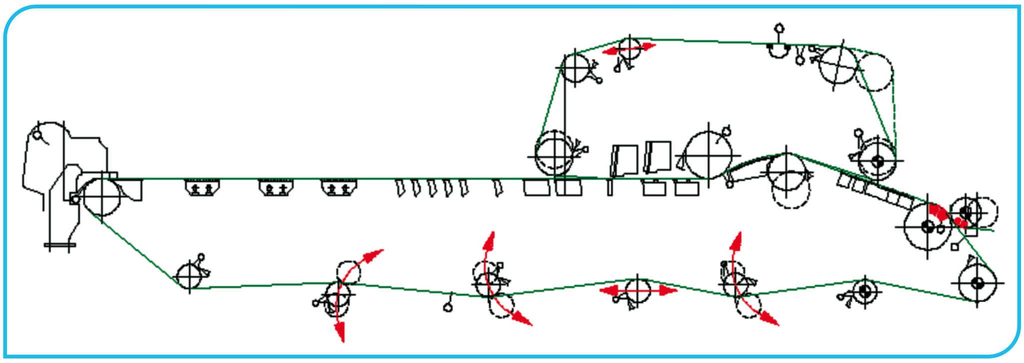

Fig.3 Voith Duoformer HMS

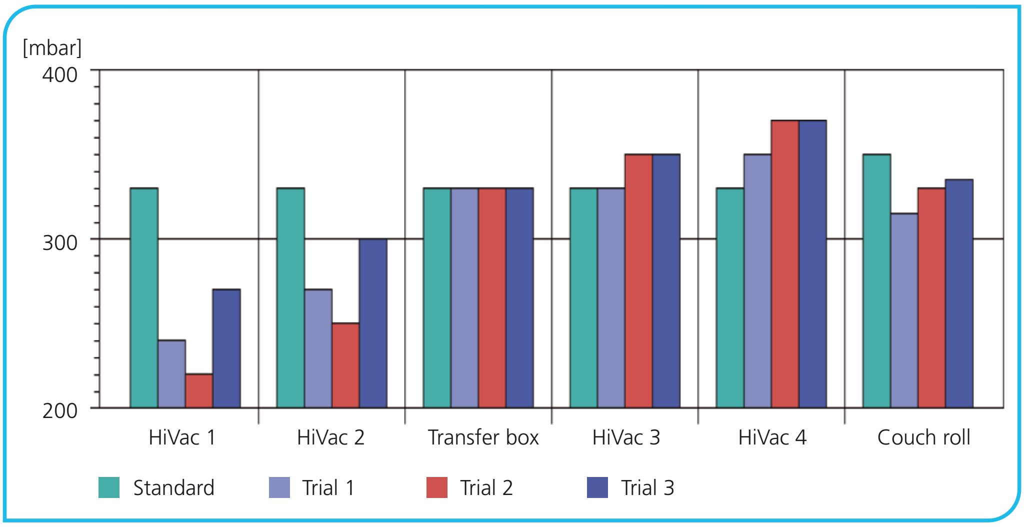

Fig.4 Vacuum setting

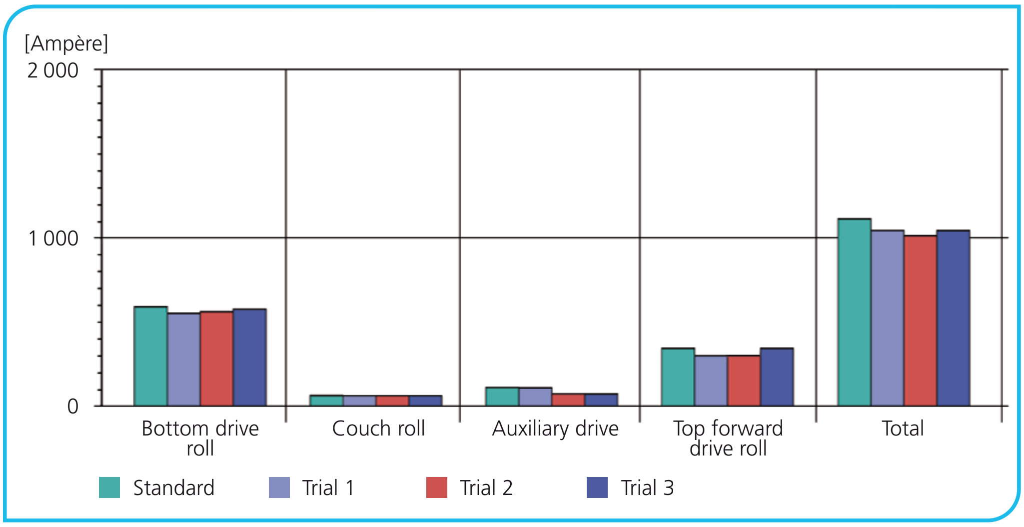

Fig.5 Electricity power of drive components

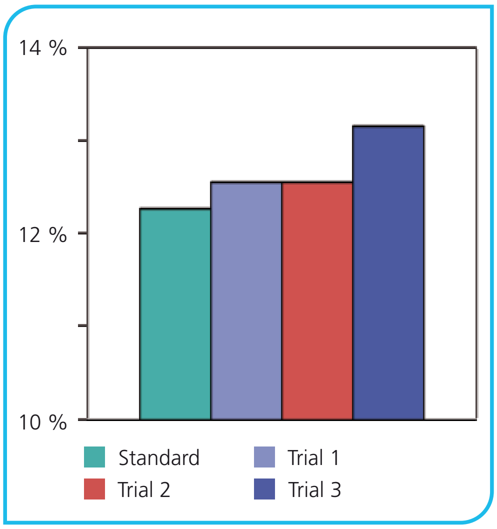

Fig.6 Pre-couch dry content

Table optimisation can offer significant benefits with minimal investment – meaning the "Return on Investment" can be high.

The prerequisite to the above success are forming fabrics which meet all of today's requirements – from highest retention to maximum dimensional stability. By fulfilling all of these requirements Heimbach forming fabrics have contributed to the above mentioned success.

2. Reducing Drive Power Consumption

Whilst the above case study clearly demonstrates that through vacuum optimisation you can save power consumption, there are further opportunities for energy reductions: the influence of forming fabric materials on the energy consumption of drive components.

The comparison between the usual alternating Polyester/Polyamide weft monofilaments (CMD) and the 100 % Duralon™ wefts in forming fabrics from Heimbach has already been demonstrated. Duralon fulfills the key criteria of today's and tomorrow's forming fabrics (Fig.7).

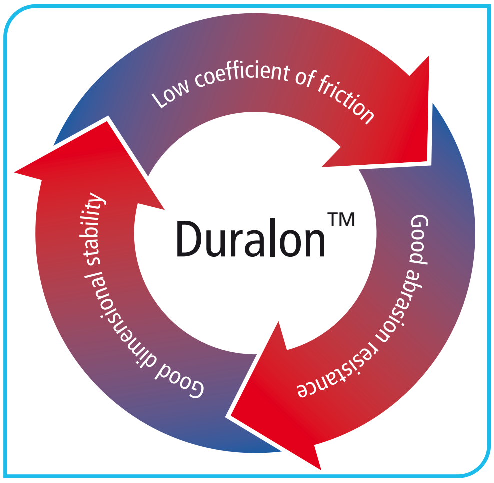

Fig.7 Main design drivers of Duralon

Case Study Drive Power

The papermachine with a twin-fourdrinier former produces Packaging Board, Testliner and Fluting at around 600-1000 m/min. The machine had recently been rebuilt in order to increase production speed and quality.

Heimbach was chosen as the start-up supplier with standard 16 shaft DL EWA+PRIMOPLAN.HD in the bottom position and a 24 shaft SSB PRIMOBOND.F in the top position – both containing Duralon.

After running the machine for 18 months it was noted that the power consumption of the drive components was significantly reduced when running Heimbach fabrics. The reason: compared to the Polyester/Polyamide wefts of usual fabrics the Duralon containing fabrics have a significantly lower coefficient of friction.

Additionally, as a greater benefit, it was possible to increase the machine speed by an average of 27 m/min.

The following comparative calculations for the bottom position are based on the maximum power capacity of couch and forward drive roll being 315 kW each, together 630 kW. The drive load of the Polyester/Polyamide fabrics has been measured on 90 %, of the Duralon fabrics on 60 %.

The paper weight produced was 135 gsm, the speed was 841 m/min whilst running Polyester/Polyamide fabrics resp. 868 m/min with Duralon™ fabrics.

<u>Comparative Calculation of Cost to Drive</u>

Cost to drive with Polester/Polyamide fabrics
(Competition)
630 kW (max. capacity) x 90 % (drive load)
= 567 kW (drive load)
567 kW x 24 hours x 350 days x 0.07 EUR/kWh
= **333,396 EUR/year**

Cost to drive with Duralon™ fabrics
(Heimbach)
630 kW (max. capacity) x 60 % (drive load)
= 378 kW (drive load)
378 kW x 24 hours x 350 days x 0.07 EUR/kWh
= **222,264 EUR/year**

The annualised saving above amounts to more than 111,000 EUR only by reducing the drive load with Duralon fabrics – being achieved with an increased speed of 27 m/min. The resulting increase of production is presented as follows:

<u>Comparative Calculation of Production</u>

Production with Polyester/Polyamide fabrics
(Competition)
135 gsm at **841 m/min**
= 17.10 t/h x 24 hours x 350 days
= **143,640 t/year**

Production with Duralon fabrics

(Heimbach)

135 gsm at **868 m/min**

= 17.65 t/h x 24 hours x 350 days

= **148,260 t/year**

The production increase of 4,620 tons per year amounts at 370 EUR/t to a selling value of 1,709,400 EURO.

Summary

Clothing costs are relatively low compared to the potential energy savings and production increases that can be achieved with modern, correctly applied forming fabric designs and materials – clearly demonstrated in the above case studies. The total PMC cost is approximately 2 % of the total operating costs of a paper machine – a small number compared to the 35 % required for energy expenditure!

Forming fabrics have a greater effect on final properties than press and dryer fabrics but less effect on energy consumption. However, through optimisation of the former elements and correct application of forming fabric designs and constituent materials significant energy related benefits are achievable.

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