SSB forming fabric production.

Effective forming fabric concepts – for economical paper and board production

Energy consumption is an increasingly important point of attention within the paper industry. Oil prices have reached all-time highs, driving up in turn the cost of energy, raw materials and additives. And at the same time, paper and board prices are under pressure. Rising costs and falling prices clearly mean less profitability. This article touches on some aspects where forming fabrics, especially SSB designs*, are able to help in reducing papermaking costs.

*** SSB fabric concepts**

SSB stands for Sheet Support Binder – the latest technology in forming fabric production. In contrast to conventional 3-layer forming fabrics, separate binding threads for holding together the individual layers are not required.

Forming fabrics

Forming fabrics are technical consumables in the process of making paper and board. The function of a forming fabric is to help the mills reach the required paper/board quality and achieve the highest paper machine runnability. Within time, constant innovations in forming fabric designs have helped make paper machines wider and faster while improving the quality and runnability requirements.

Forming fabric cost-comparison

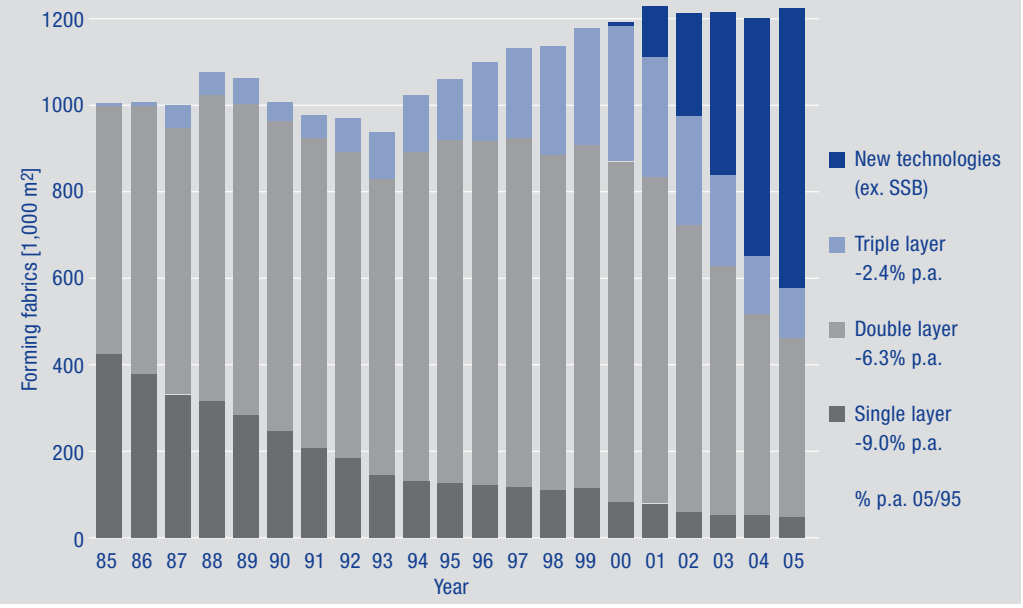
The contribution of forming fabrics to reducing costs can be viewed from two sides. There is, of course, the price of the forming fabric itself. The price is normally dependent on the design, the dimensions and the possible options applied. Secondly, there are costs that can be reduced by applying a particular forming fabric design. A forming fabric is a technical product that has a big influence on runnability, energy, raw material and additives costs.

A good way to judge the forming fabric price is to use the specific forming fabric cost in Euro/1,000 tons of paper produced. The specific cost can easily be calculated by multiplying the specific forming fabric consumption (m^2/1,000 tons of paper produced) by the forming fabric price per m^2 (Euro/m^2). Working with the specific forming fabric price has been a real eye opener for many people who often come to premature conclusions based merely on the price of the fabric.

Specific forming fabric consumption

Modern SSB concepts have significantly decreased the specific forming fabric consumption. The share of SSB concepts has increased from just below 10% to over 50% from 2001 to 2005. At the same time, the specific forming fabric consumption for all designs has decreased overall from 14.3 m^2/1,000 tons to 13.0 m^2/1,000 tons, a reduction of nearly 10%**.

Forming fabrics total deliveries in Western Europe (Plastic only 1,000 m^2)**



*** Source: PCA, statistics bulletin no 12 – September 2006 – Western Europe only*

Forming fabrics cost-savings potential

Apart from the specific forming fabric price, the savings that can be attained by applying the most suitable forming fabric design are far more interesting. Optimally fulfilling the two main functions of a forming fabric (paper quality compliance and PM efficiency) not only brings substantial savings thanks to higher paper machine efficiency, but also reduces energy, raw materials and additives consumption.

SSB fabrics – the optimal solution

Contradictory needs and wishes regarding the wet end of a paper machine often mean making a compromise. Currently, the SSB designs hold the lowest concessions and the highest possibility of helping paper mills reach the required paper/board quality, achieving the highest paper machine runnability and most economical production. SSB fabrics with their special advantages optimally support our customers in reaching their requirements, and, therefore, bring the highest potential cost savings for the wet end.

Introduction of the SSB concept has lead to an increase in paper and board quality and better machine runnability. In the graphics sector, where there is a high percentage of recovered paper, the conventional three-layer designs cause quality problems,

i.e. marking and roughness, and sometimes lead to poor runnability through delamination problems and limited life potential. Therefore, this part of the industry was more or less forced to stick to double-layer designs. The SSB designs are now able to eliminate these negative effects while improving formation, Z-direction fines/filler distribution and runnability.

Other cost parameters

SSB designs have made it possible to boost machine runnability and reduce the amount of costly raw material and additives. Machine efficiency is increased as a result of cleaner run and better water handling. Formation is improved due to the ability to apply less retention aid, run at higher speeds without risk of marking, and ensure a more controlled water handling. Smoother paper and board surfaces and more uniform Z-direction filler/fines distribution has led to savings on coating/starch consumption, and less waste due to blackening.

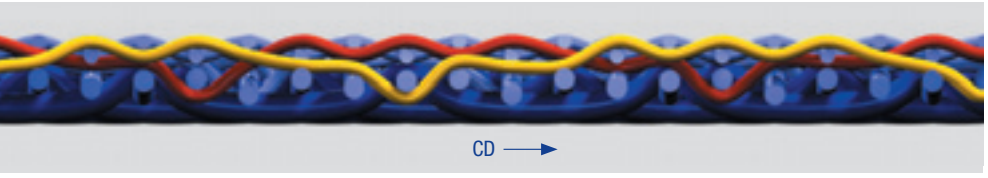
Operating media consumption

Apart from raw material and additives, paper machines also need energy and other operating media. The different types of energy and media consumed on and around a wire section are electricity, vacuum, hydraulic, air, water, and sometimes steam. Significantly influenced by the applied forming fabric design are the consumptions of electricity, vacuum and water. Electrical power is required for driving the fabric, vacuum is required for dewatering and sheet transfer, and water is used to clean the fabric or for sheet knock-off.

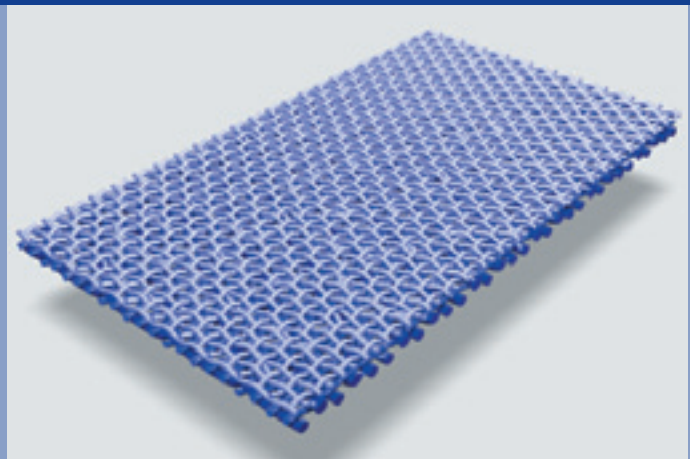
The right choice of a fabric can significantly decrease power consumption. A fabric design with an open machine-side structure undergoes less resistance from the dewatering elements, and, therefore, consumes less operating power. As a rule of thumb: the percentage decrease in number of wear side cross direction yarns corresponds to the amount of electrical energy saved. Optimal energy savings are achieved here by using modern SSB designs with paper side versus machine side weft yarn ratios bigger than 1.

Vacuum is used for dewatering and for transferring the sheet. The majority of the energy is consumed by the high vacuum elements. Fabrics that stimulate homogeneous sheet formation during the dewatering process, thanks to their surface design and pulse transmission, are likely to need less vacuum. During sheet formation the open sheet structure is retained in the forming section and facilitates dewatering through the suction couch roll. A forming fabric with a fine paper side and a high open surface area with the right air-permeability range will help with this aspect. An additional advantage of such a design is that less power is required for driving the fabric.

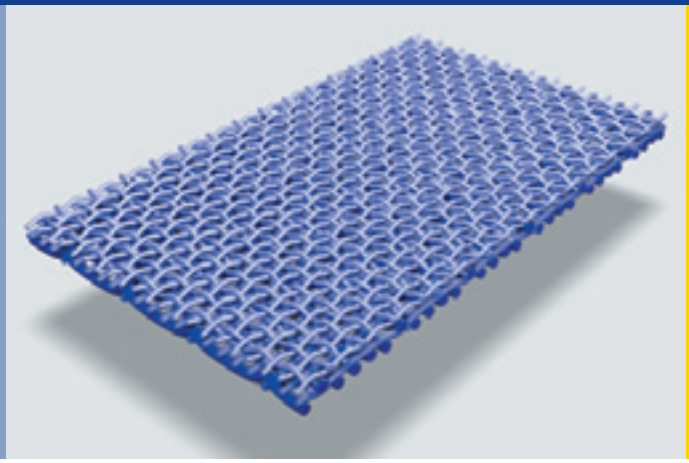
Water is used among other purposes for keeping the fabric clean and for knocking off the sheet. If the forming fabric is designed in a way that allows it to run cleaner, then naturally less cleaning is required. High-pressure spray pipes with smaller holes can then be used, and in many cases they are even replaced with periodic use of e.g. a Voith DuoCleaner. Thin forming fabrics with low internal volume require less water to knock off the sheet. In both cases less fresh water is used, thus enabling significant cost-savings potential. As mentioned, fine forming fabrics with high paper side support and open wear sides offer the best savings potential.



Binding weft thread pattern in an SSB fabric design.*



PrintForm HQ.



PrintForm HR.

Well-proven products

Voith Paper Fabrics has a strong new SSB product range known under the names PrintForm H and MultiForm H. Within this range we have two unique products: the PrintForm/MultiForm HQ and HR. The PrintForm HQ can be placed in the "fine" segment of SSB designs. It is a design applied typically in the graphics area for high-quality grades.

The MultiForm HR is a somewhat more robust forming fabric design, specially conceived for high-quality packaging grades (corrugated board). They both provide the ultimate support for our customers' requirements, and offer a high cost-savings potential thanks to their fabric design.

PrintForm HQ, MultiForm HQ

The distinguishing characteristic of Voith PrintForm HQ and MultiForm HQ forming fabrics is their low warp density and high number of cross directional yarns. This results in extremely good sheet support. The HQ designs have a relatively coarse machine side with high shear and cross directional stability, which makes for long life potential. The applied high shed weaving technology (see twogether 21, p. 58 ff.) gives a mark-free structure. By selecting the optimal design, cost savings can be achieved in clean running, additives use, vacuum, water and power consumption.

PrintForm HR, MultiForm HR

An important advantage of MultiForm HR and PrintForm HR forming fabrics lies in their open warp density, resulting in the same advantages as with the HQ fabrics. Another advantage of this design is that the wear side holds long cross directional weft flotations, giving the fabric long life potential. The floats go over 8 instead of the more usual 6 or 5 warp threads. Here again, selecting the optimal fabric design brings cost savings in clean running, additives use, vacuum, water and power consumption.

Summary

SSB forming fabrics offer huge savings potential in the wet section. The somewhat higher price of SSB fabrics soon pays off thanks to the resultant savings in and around the forming section. These savings are due not only to the higher machine efficiency, but also with regard to raw materials use, additives consumption and power consumption.

Contact

Johan Mattijssen
Fabrics
johan.mattijssen@voith.com