

The Vector press fabric breakthrough – smooth paper, smooth production, smooth printing: smoothing the way to higher profits with Vector tri-axial composite press fabrics

The paper industry needs press fabric enhancements that provide better void volume retention, higher after press solids (dryness) and a smoother sheet finish. Voith Fabrics responded with the Vector solution, a tri-axial, non-woven concept. This is the first stage of a multi-platform system of pressing advancements from Voith.



Tom Coulter

Voith Fabrics
tom.coulter@voith.com



Eric Arseneault

Voith Fabrics
eric.arseneault@voith.com

Features

- Non-woven, tri-axial polyamide structure
- Improves batt bonding
- Smooth “non-knuckle” pressing surface
- Increases resistance to compaction
- Reduces hydraulic flow resistance

Applications

- Finish-critical positions
- High water handling requirements
- Compaction resistance is critical
- Safer, faster installation (seamed)

Results

- Reduces seam wear
- Eliminates seam mark
- Improves sheet smoothness
- Increases sheet dryness

Even when papermakers do everything right, producing equal smoothness on both sides of the sheet is a formidable task. The challenge to eliminate two-sidedness is even greater on high-speed machines. The introduction of Vector’ press

fabric technology, level one of Voith’s new Surface Improvement Platform, is not only smoothing out the sheet but also smoothing out production bottlenecks.

Smoothness gains add up to higher profitability through improved quality and fiber savings; a reduction in calendering requirements translates into higher sheet caliper. Perhaps the biggest benefit of all happens beyond the paper mill on demanding printing presses – where more consistent printability on both sides of the sheet occurs.

In a quest to improve on the age-old sheet roughness issue, Voith Paper Technology’s R & D explored the concept of building a laminated construction utilizing non-woven technology to improve overall sheet quality. The idea worked so well that what we now call Vector has become the reference for optimum smoothness in press fabric technology (Fig. 1).

Composite Tri-Axial Design

Voith Fabrics utilizes a unique manufac-



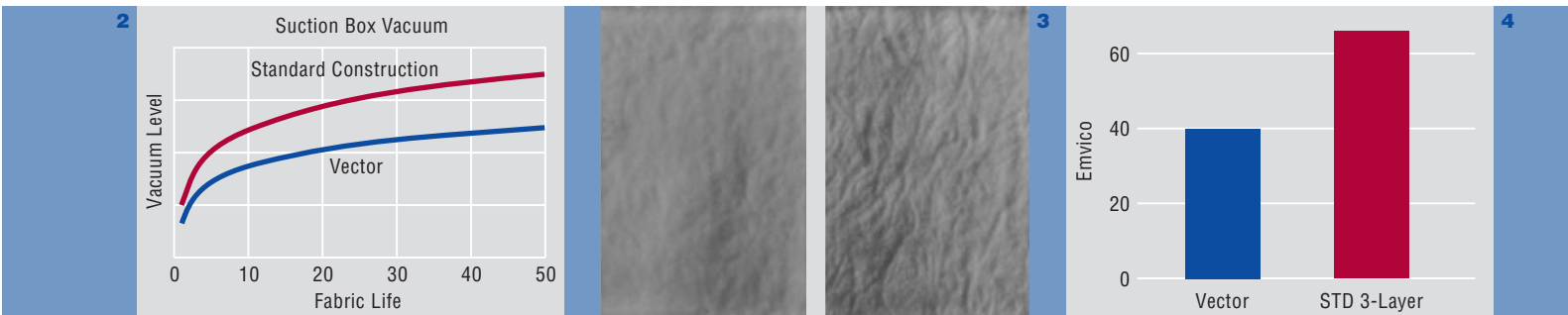
Fig. 1:
Vector 3.

Fig. 2: Suction box fabric dewatering vacuum levels.

Fig. 3: Vector – improved sheet quality (left); Standard 3-layer (right).

Fig. 4: Sheet quality – 40% improvement.

Fig. 5: Vector seam provides significant improvement in seam integrity. Vector 62 days (left); Standard seam 55 days (right).



turing process to produce a truly composite fabric.

The non-woven element defining the Vector system is made of tri-axially oriented microfilaments. The Vector layer provides a uniform open structure that significantly improves dewatering over extended periods.

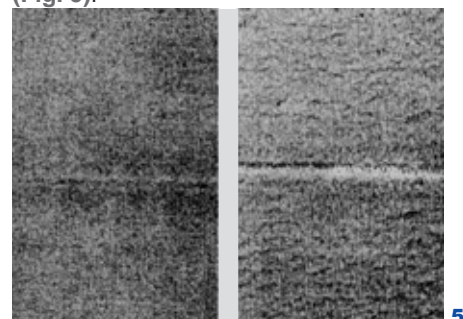
In addition to machine direction (MD) and cross-machine direction (CMD) open water removal channels, the tri-axial system provides superior z-direction flow properties in demanding press nips. In combination with the open channels, the Vector offers z-direction resilience which yields higher permeability control over the life of the fabric. Field results confirm that suction box fabric dewatering vacuum levels increase at a much lower rate when compared to other structures (Fig. 2).

In terms of surface uniformity, the Vector technology has enhanced micro/macro scale surface characteristics (knuckle-

free pressing). The proprietary pressing surface, exclusive to Vector, is the leading design concept in the press fabric industry today.

Figs. 3 and 4 illustrate the improvement in sheet quality obtained using the Vector technology on a machine producing high-quality board.

Whether the fabric’s construction is seamed or endless, the benefits are similar. Improved sheet finish and dewatering capabilities are maintained throughout the entire life of the fabric. Regarding seamed fabrics, the additional advantages of superior flap durability and elimination of seam mark are also provided (Fig. 5).



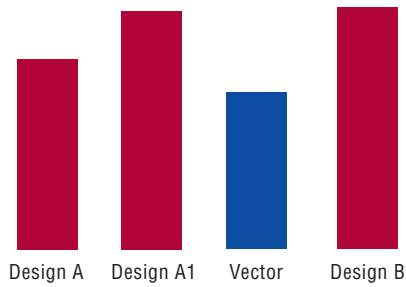
Case Studies: Graphic Paper Producer Smooths the Top-side

An SC paper manufacturer wanted to improve top-side sheet smoothness in order to further improve two-sidedness numbers. Improved two sidedness yields better printing results and therefore higher impact for advertisers and catalog producers.

The modern high-speed machine is producing high-quality SC paper; the press section is a tri-nip configuration including a shoe press on the 3rd press position.

Following the initial investigation, Voith Fabrics elected to target the shoe press position (3rd press) as the best opportunity for providing two-sidedness improvements. It is well known that the long dwell time and unique pressure pulse of the shoe press has the effect of creating a two-sided sheet (felted top/ceramic roll bottom).

6



After having defined the objectives with mill personnel, the Vector technology was selected as the best design for sheet smoothness improvements.

The Vector 3 press fabric was installed on the shoe press position and provided better sheet smoothness. On average, the top-side PPS figures were improved by 16 percent when compared to Voith Fabrics' standard design and by 18 percent when compared to the competitor's construction.

In addition to significant improvements in sheet smoothness, the Vector press fabric resisted compaction and filling better than previous designs. Suction box dewatering remained high throughout the period of operation (110 g/m² vs. 20 g/m² moisture drop at suction box) indicating a high level of water-handling capability.

Vector technology has now become the standard design for the 3rd press position and is also being evaluated on other positions in this mill.

Considerable Fiber Savings

Seeking to increase effective press fabric performance, wood-free copy paper producer Weyerhaeuser, Dryden, Ontario, Canada, tried the Vector tri-axial composite on their shoe press position (3rd press). The press fabric ran for 65 days and on average increased smoothness by

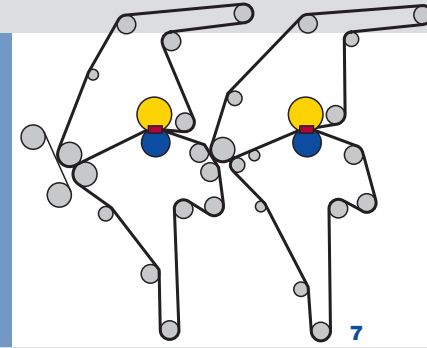


Fig. 6: Basis weight standard copy.

Fig. 7: Tandem NipcoFlex press configuration.

3 points (Sheffield) leading to a reduction in calendering requirements.

Because of tighter control of sheet caliper, the mill was able to reduce their basis weight (Fig. 6). According to Scott Beckett, PM 2 production manager, based on their production rate, this represents significant savings in fiber costs. Additional trial work is currently under way.

Smoother Production – Taking a Load Off The Press Section

Visy Recycle Inc. in Staten Island, N.Y. wanted to improve the water handling and efficiency of their press section. Historically, the 1st press nip load had to be reduced at mid-life of the pickup and bottom fabrics. Running at maximum press load during the complete life of the fabrics led to sheet following and picking in the 1st press. The reduction in loading reduced the press efficiency and lowered production.

Their PM 14 is a modern machine producing 120 g/m²-200 g/m² corrugating medium at 950 m/min; the press section is a Tandem NipcoFlex shoe press configuration (Fig. 7).

Voith Fabrics had not previously been a supplier to the machine. After a thorough analysis of the press operation, Voith Fabrics recommended the Vector 4 (Fig. 8) for the Pickup and Bottom and

the Vector 3 for the 2nd Top and Bottom. Vector was selected because of its outstanding water handling. The tri-axial Vector technology was engineered to maximize void volume, decrease water flow resistance and improve z-direction resilience.

With the Vectors installed, Visy's production team was able to run at maximum press load for the life of the fabrics. The Vector 4 Pickup and Bottom eliminated sheet following/picking and improved weir flows by 15 percent. Visy was able to increase the speed of the machine on the lightweight grades by over 30 m/min. The machine set a daily production record and a monthly production record while the Vector fabrics were running. The Vector technology has now become the standard design for this press section.

The Vector's principal assets are its ability to improve dewatering and maintain openness throughout its life.

In addition, the Vector's sheet improvement results have established it as the foundation of Voith's newly launched Surface Improvement Platform.

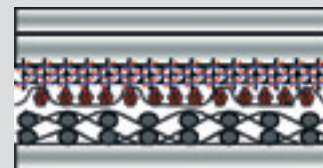


Fig. 8: Vector 4.