

Valmet

Technical Paper Series

Dryer Fabrics

Executive Summary

Valmet's dryer fabric product range covers all the dryer fabrics needed on paper and board machines. The PET fabrics (made of polyester) are for normal paper machine conditions, whereas the PPS reinforced dryer fabrics are for hydrolysis-prone positions where high steam pressures are used.

Valmet has made dryer fabrics out of synthetic monofilament yarns with today's techniques since the 1960s. Since the beginning of 2000, it has manufactured over five million square meters of dryer fabrics. The main product, TamStar, is an economical dryer fabric with a running life measured to be 15-30% longer than traditional dryer fabrics. This was verified in a study on fabrics that were run in Finland during 2000-2009.

Valmet also specializes in fabric care and maintenance products and services. With a comprehensive range of fabric guides, stretchers, cleaners and onsite services, Valmet extends fabric lifetimes and brings the total cost of fabric ownership down.

What's required of a modern dryer fabric

The main task of a dryer fabric is to transfer the paper web from the press section to the pope reel through the challenging (hot and humid) paper machine hood environment. A dryer fabric must also act as a drive for otherwise undriven rolls and cylinders.

Although paper machine speeds are increasing all the time, the average lifetime of a dryer fabric is also increasing. This means several million extra laps over a dryer fabric's running lifetime.

The runnability challenges set by higher paper machine speeds and modern, more effective sheet stabilizers have doubled the running tension of dryer fabrics. Due to the high tension, the fabric's wear resistance and strength - especially seam strength - at the end of the planned running time are very important.

Good basic properties of a dryer fabric

- Durability
- Strong seam
- Dimensional stability
- Easy to keep clean

Dryer fabric conditioning

Dryer fabrics don't get nearly the attention that wet press and forming fabrics get due to their long life, reliability, and environment in which they are located (too hot to inspect on the run). However, dryer fabrics have a great impact on machine runnability, tail threading, sheet defects, and steam drying efficiency and costs. Dryer fabrics that are plugged up with fiber, pitch, oil, and stickies see their air flow permeabilities drop significantly. This can cause sheet wrinkling, edge cracks, and edge drop off especially in the early unrun dryer sections that have blowboxes.

Keeping dryer fabrics clean and open requires periodic conditioning. Typically, the dryer fabrics are cleaned with a chemical wash (caustic) during a shutdown at crawl speed. Cleaning showers are mounted across the dryer fabric, usually above one of the felt rolls that allows the cleaning agent to get distributed and pressed through the fabric. Hot water is used to minimize thermal shocks to the dryer cans.

After cleaning, the cleaning agent is rinsed thoroughly to purge the chemicals from the fabric. If the fabric is not rinsed enough residual cleaning chemicals can attack the fabric as their concentrations increase during evaporation. This will increase fabric polymer hydrolysis, make the fabric brittle, and reduces fabric life.

The chemical cleaning process is a time consuming task. It also raises questions concerning safety during the wash - due to the demanding conditions and environmental aspects - depending on the type of chemicals being used.

Some mills have more problems than others when it comes to dryer fabric filling, usually depending on the grades being made and the pulp supply being used. Recycled paper and board grades are the worst for keeping the dryer fabric clean and open. Stickies and fines contamination tend to plug the early dryer

fabrics for these machines, affecting sheet breaks and increasing steam consumption and limiting machine production.

Keeping dryer fabrics clean during operation requires special cleaning showers. Valmet's OptiCleaner Pro (Figure 1) dryer fabric cleaning systems utilize traversing high pressure water shower nozzles to keep the fabric permeability uniform and contamination free throughout the dryer fabric's life.

Efficient cleaning

OptiCleaner Pro dryer fabric cleaner enables continuous or intermittent cleaning operation during production. It cleans the fabric on the paper sheet side with a high-pressure water jet supplied by the cleaning head travelling in the cross-machine direction. Water mist and dirt are removed by means of an air curtain and vacuum. An air comb (Figure 2) blows the cleaning mist off the fabric to prevent wet streaks on the paper sheet. To minimize sheet quality effects due to moisture streaks, vacuum is applied just past the cleaning shower head.

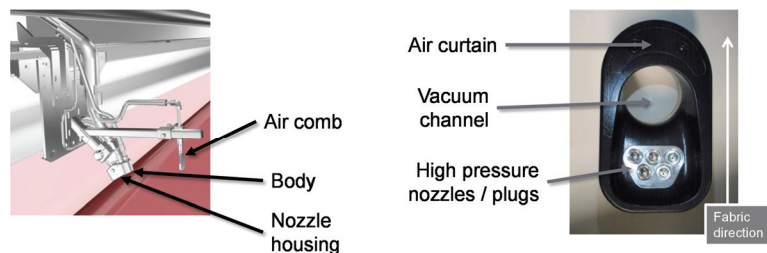


Figure 2. Optimized cleaning effect: select nozzle size, number of nozzles and adjust the cleaning pressure. Easy nozzle replacement with quick couplings.

The cleaner removes dirt by means of the cleaning head's high-velocity air flow generated by a vacuum unit. The removed dirt and water mist are conveyed through a pipeline to a cyclone separator in the vacuum unit (Figure 3), where heavy particles are separated from air and led to a container or sewer. The cleaning head, outlet pipeline and cyclone separator are flushed after a set of cross-machine cleaning sequences.

Reduced daily maintenance

Dirt is conveyed freely and efficiently through the outlet pipeline out of the machine to a cyclone separator. There is no saveall or other components that would require extra cleaning or maintenance work.

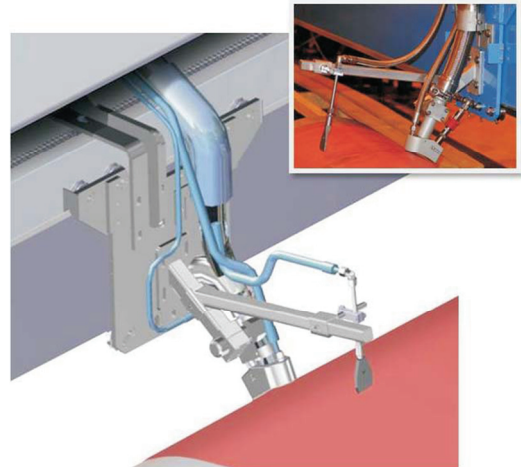


Figure 1. OptiCleaner Pro increases production volume and maximizes the lifetime of your dryer fabrics.

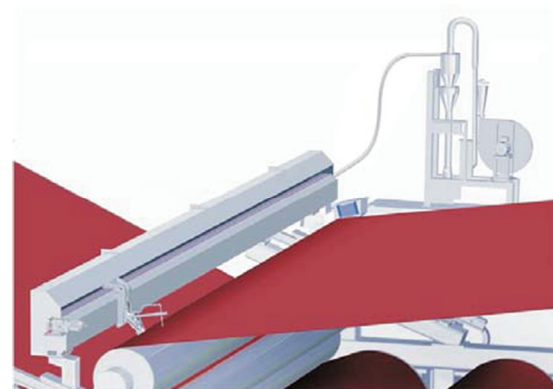


Figure 3. Dirt and water mist are conveyed out of machine to a cyclone separator where heavy particles are separated from air and led to a sewer.

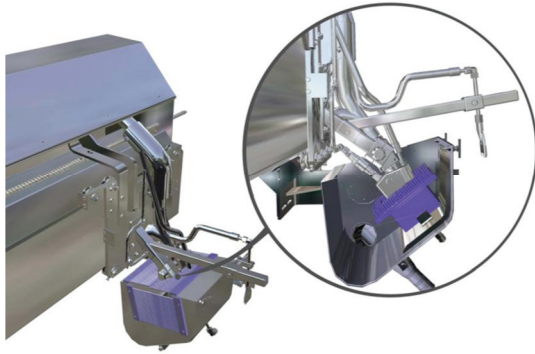


Figure 4. Washing station on tending side inside the hood. Duration of wash sequence and water flow can be adjusted.

The cleaning head is washed automatically at the washing station (**Figure 4**), located typically inside the hood on the tending side. The duration of the washing sequence and the cleaning head water flow rate can be adjusted.

Service at regular intervals ensures break-free operation of the cleaner, machine runnability and good end product quality. Valmet offers a maintenance service agreement which includes scheduled service visits combined with fabric inspections and measurements. Follow-up through a remote control system is also possible.

Benefits of the OptiCleaner Pro dryer fabric cleaner include:

- Enables continuous or intermittent cleaning operation during production
- Maximizes dryer fabric lifetime
- Increases production volume
- Effective fabric dirt removal out of the machine
- Easy daily maintenance
- Optimal operation with Valmet's maintenance agreement

These systems have performed well in the field with positive customer feedback. One such installation is at Palm Wörth in Germany.

Case Study: Maximizing fabric lifetime

The cleanliness of the dryer fabrics has a significant effect on the production efficiency. This is generally seen as a reduced number of breaks, dryer section energy savings, and improved paper or board quality. This is also a fact at Palm Wörth PM 6 (**Figure 5**) after the installation of Valmet's new OptiCleaner Pro dryer fabric cleaner.

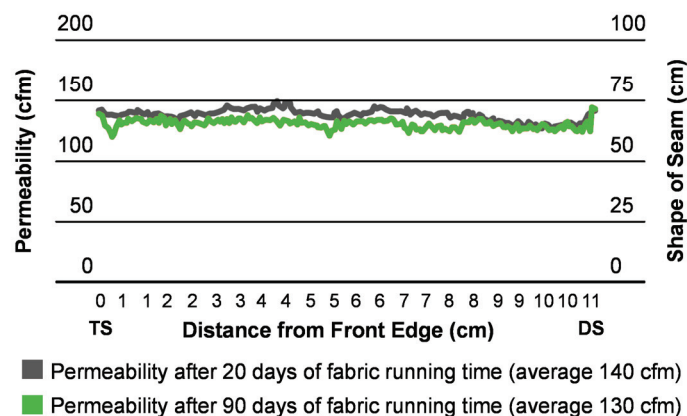
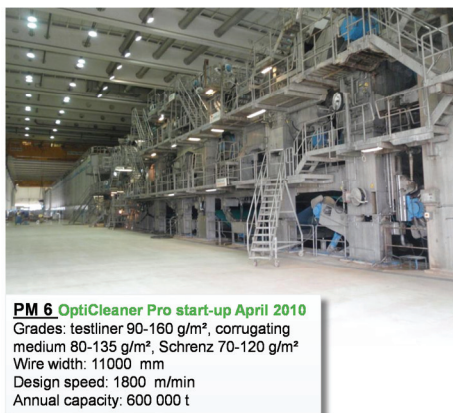


Figure 5. Thanks to the OptiCleaner Pro dryer fabric cleaner the permeability has remained at a very good level at Palm Wörth PM 6.

The new OptiCleaner Pro dryer fabric cleaner was installed in April 2010 at the 10th dryer group of the 11-m-wide Palm Wörth PM 6 in Germany, to ensure proper cleaning of the fabric. The cleaner works well with all grades and keeps fabric permeability at the desired, optimal level. Thanks to this, fabric lifetime and service intervals are longer, which gives creates savings.

The crew of PM 6 is impressed with the air comb because it enhances the cleaning effect. They are also pleased that the cleaner is connected to a separate vacuum unit. This is a better option than connecting the cleaner to the wet end vacuum system, which is typical with conventional cleaner solutions. The cleaner starts automatically by default. This feature was requested by the customer. "We are overall very satisfied with the OptiCleaner Pro dryer fabric cleaner," says the Mill Manager for Palm Wörth.

Profile measurements enhance energy economy in the dryer section

By far, the most important dryer fabric measurements consist of two key elements: an air permeability check (**Figure 6**) and a fabric condition test during a shutdown. It's thus no wonder that customers have become accustomed to seeing Valmet's technical service staff working on the machine particularly at that time.

"A condition check-up during a shutdown is important because it enables us to detect problems that may cause premature damage to the fabrics. It also reveals wear stripes on the fabric and shows air permeability levels, which are important in terms of section and for paper machine runnability," stated the Product Manager for dryer fabrics at Valmet.

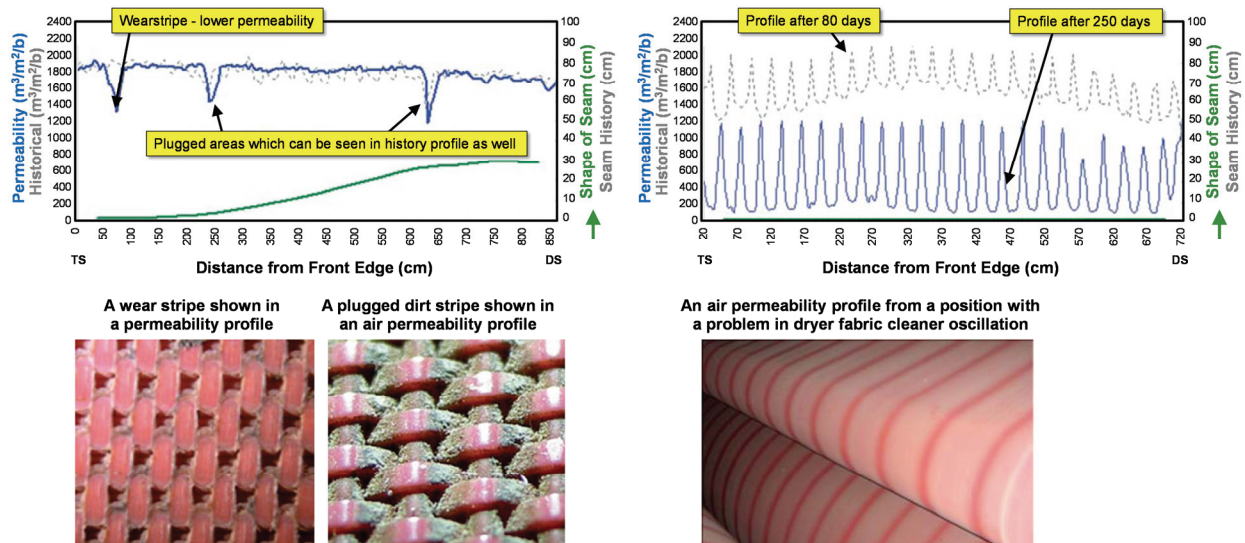


Figure 6. Air permeability measurements can discover and thereby help avoid problems that cause premature damage to dryer fabrics.

Traditionally, air permeability has been measured with spot checks, that is, by testing it at 8-12 points across the fabric. "This method, however, does not give a complete picture of the air permeability profile. This is why we now measure the whole air permeability profile," he added.

Some of the sheet moisture profile problems are caused by plugged stripes on the dryer fabrics due to extensive wear or dirt. Evaporation of moisture through the plugged areas is weaker than elsewhere through the fabric. With modern techniques, the profile meter now takes readings at every five centimeters. This means that on a wide machine there can be over 200 measuring points to determine the air permeability profile.

"Getting rid of the plugged stripes on a dryer fabric means better energy economy for the paper machine as the paper sheet does not need to be over-dried to eliminate the moisture profile variation," the Product Manager explained.

Fabric guides ensure smooth web runnability and longer fabric life

Fabrics are the most important part of the machine for transferring the web. Keeping the web stable is essential for improving the runnability of the production line. The number of breaks can be significantly reduced and speed increased if the web travels through the machine with minimum stress. Any problem occurring in the web run may cause speed decreases and, ultimately, financial losses.

The ComPass Guide Family provides a comprehensive range of fabric guide solutions for all paper machine fabric and felt positions (**Figure 7**). Guides provide correct fabric position which ensures smooth web runnability and optimal paper quality and paper production. The guides center the fabric (if needed) and prevent the fabric from colliding with machine frames, reducing fabric edge wear, maximizing fabric

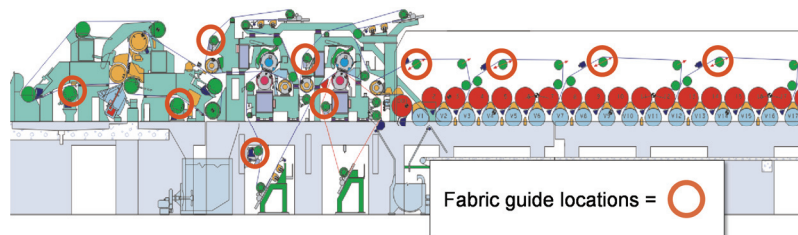


Figure 7. Fabric guide placement

life, and reducing fabric- and web run-related breaks. Valmet offers a comprehensive range of proven and cost effective fabric guide solutions for all machine sections. To best suit each customer's preference, the guide's actuator can be electrical, pneumatic or hydraulic.

The wet end guides feature reliable design especially suitable for challenging wet end conditions and provide optimal fabric guidance with multiple solutions. The guides operate with bellows or by electric motor; control is manual or automatic. The guides can be mounted vertically or horizontally. Some models offer a possibility to insert a doctor to the guide frame.

ComPass guides for the dryer section (**Figure 8**) ensure a reliable straight run of dryer fabrics in high temperatures of the hood. The guides operate via pneumatic cylinder or electric motor. The automatic electromechanical guide is located on the tending side under the guide roll bearing housing. It offers precise control response with a minimum space requirement and is used with the non-contacting ultrasonic UltraEdge guide control system. The horizontal guide is located inside the fabric loop at the

tending side. Movement is by a pneumatic cylinder. The guide operates perfectly at high temperature levels.

Benefits of the ComPass Guide Family include:

- Optimal and accurate fabric guidance (better fabric tension control, longer fabric service life and improved runnability)
- Designed for minimum maintenance to reduce mill downtime
- Simple construction with good adjustability
- Minimum vibration levels
- Easy roll changes, easy felt changes

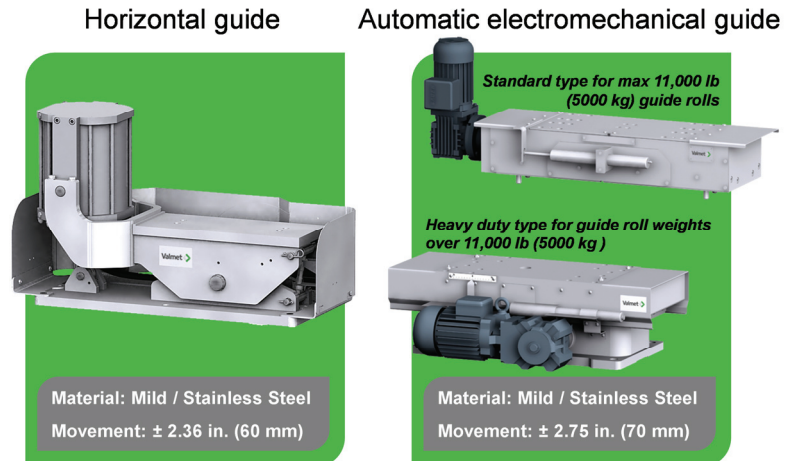


Figure 8. Valmet fabric guides for the dryer section

Case Study: Mill switches to Valmet guides

A North American mill producing corrugating medium underwent many transformational changes over the course of several years, including over \$90 million in expansion and facilities improvement capital over 17 years. The mill is well known for superior quality and also for their very fast board machine.

The mill purchased one wire guide from Valmet to improve its web handling at BM1. The idea with this upgrade was to replace the old Beloit-made guide from 1991 and at the same time to get rid of the extra adjustment needed after the shutdowns. According to managers at the mill, the change went well and the requirements were fulfilled. Valmet's guide had a 4" adjustment possibility, instead of the 3" Beloit used to use. That one inch made the difference.

Although the Valmet guide was a bit different from the old Beloit type guide, very few changes needed to be made during assembly. The same guide palm and stand were used with the new guide after lifting the base in order to get more wrap for the roll and wire.

During the same shutdown a new Valmet guide was also installed in the dryer section. Local erectors under the supervision of a Valmet specialist made both guide changes.

After the first successful installation, the mill purchased additional guides for the dryer section to be installed in future shutdowns.

Double-cloth structure makes TamStar last long

The TamStar dryer fabric family consists of several fabric designs with different functional properties - all designed to improve papermaking efficiency. They all feature the unique double-cloth structure, which contributes to a long running life. The longer lifetime of the TamStar dryer fabric is proven in practice.

According to a study on the fabrics that were run in Finland during 2000-2009, TamStar's running life was measured to be 15-30% longer than that of traditional dryer fabrics.

Other much-appreciated features of all TamStar dryer fabrics include good runnability, elongation of less than 1%, a very strong and non-marking warp loom seam, and easy installation thanks to the straight seam loops. All the members of the family - TamStar OS, TamStar HighSpeed and TamStar HighPerm - share the same long-lasting features.

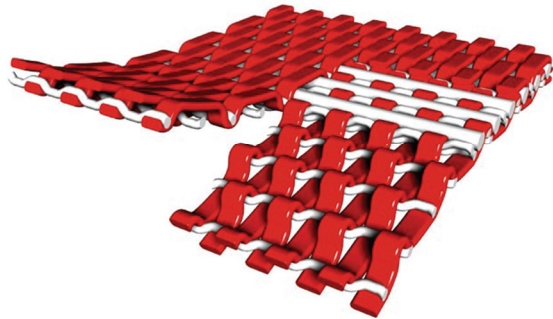


Figure 9. The TamStar double-cloth structure has two fabric layers.

The double-cloth structure improves wear potential

The secret behind TamStar's significantly longer lifetime lies in its unique double-cloth structure (Figure 9).

TamStar has up to 40% more machine direction yarn material than a conventional dryer fabric. Its structure with stacked MD yarns ensures excellent strength, which is higher than 200 kN/m.

Figure 10 shows how a conventional dryer fabric is heavily worn on the roll side and how each machine directional yarn has lost its strength.



Double-cloth TamStar

Fabric strength: 1140 pli -> 570 pli
(200 kN/m -> 100 kN/m)

Conventional dryer fabric

Fabric strength: 855 pli -> 0 pli
(150 kN/m -> 0 kN/m)

Figure 10. The double-cloth structure ensures better wear potential.

Because of the double-cloth structure, TamStar's roll side takes the wear, allowing the machine-direction yarns on the paper side to stay undamaged.

In Figure 11, the roll side of TamStar has hit the edge sealing of a sheet stabilizer and the roll side of the fabric is worn out. However, in this case, it was possible to run the fabric until a planned shutdown, because the paper side of the fabric, and especially the non-ravelable seam area, were undamaged.

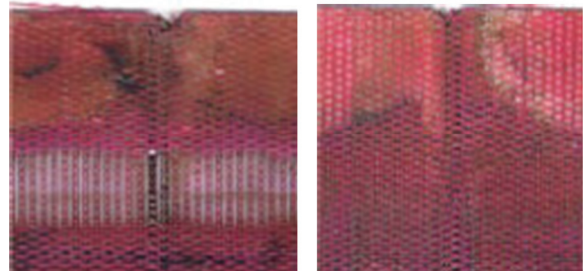


Figure 11. The double-cloth structure provides excellent damage resistance in the case of accidents.

Only minimal stretching

In a modern dryer section, the stretcher roll movement allowed can be less than 2% with fabric stretching of 1.0-1.5%.

This may lead to a short fabric lifetime and a premature fabric change, if the fabric elongation is too big. Today, the fabric elongation specification set by the leading paper machine suppliers is less than 1% at 23 pli (4 kN/m) tension. Dryer fabric elongation of more than 1% is critical, because in practice the tension can be even higher.

The ratio of machine direction yarns in TamStar is up to 70% of the basis weight. Compared to a conventional dryer fabric, TamStar's significantly higher amount of machine direction yarn material and a structure locked in heat setting decrease elongation significantly. **Figure 12** shows the elongation of TamStar and a conventional dryer fabric as a function of fabric tension. At 23 pli (4 kN/m) tension, elongation of TamStar is only 0.7%.

Conventional dryer fabrics stretch 1.0-1.5% and there is a risk that the fabric stretches out of the machine, leading to too short a fabric lifetime.

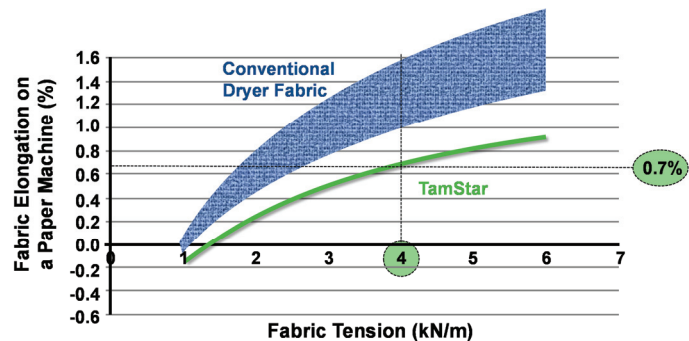


Figure 12. TamStar elongation is less than 1%.

The strongest seam on the market

It is extremely important that the seam has a high enough initial strength and that its structure is non-ravelable. TamStar's warp loop seam (pin seam) has a lot of machine direction yarn material, which allows a seam with a large cross-sectional area and excellent strength. TamStar's warp loop seam measures more than 285 pli (50 kN/m) tensile strength as new. Even more importantly, it has excellent late life strength thanks to the tie-back area which protects seam loops from wearing out (**Figure 13**).

In conventional seams, the machine direction yarns that bind the seam spiral have been twisted. This decreases the seam strength, increases the seam thickness and may cause sheet marking. In TamStar's warp loop seam, all yarn floats are straight and have not been twisted (**Figure 14**). TamStar's stronger and non-ravelable warp loop seam withstands wearing better without any weakening and raveling.

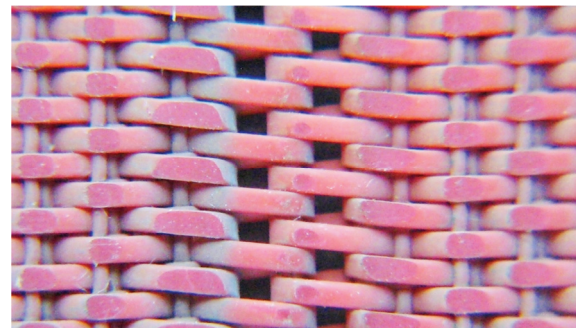


Figure 13. TamStar's warp loop seam wear rate is minimal.

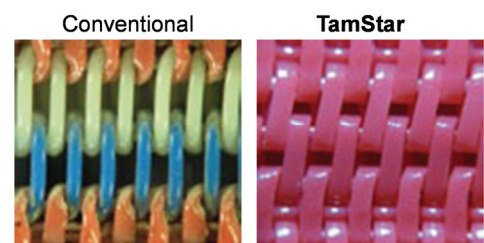


Figure 14. TamStar's warp loop seam has no twisted loops.

Easier to keep clean

Correct dryer fabric permeability is a precondition for the efficient operation and runnability of modern, vacuum-utilizing sheet stabilizers. Permeability also needs to stay in an operating window throughout the entire dryer fabric lifetime.

A contaminated dryer fabric surface decreases runnability and causes an uneven moisture profile. Contamination, especially when recycled furnish is used, is today the most common reason for changing a dryer fabric. The need for easy cleaning of the dryer fabric with high-pressure cleaners has become an important criterion for selecting the dryer fabric type and structure.

Valmet's TamStar HS dryer fabric features cleaning channels through the double-cloth fabric structure to allow for easy cleaning. The easier the high-pressure shower penetrates through the fabric, the better the cleaning result.

Figure 15 shows how easily the high-pressure shower goes through the fabric. In a conventional dryer fabric, the cleaning shower goes through the fabric in a more labyrinthine way, resulting in a lower permeability level.

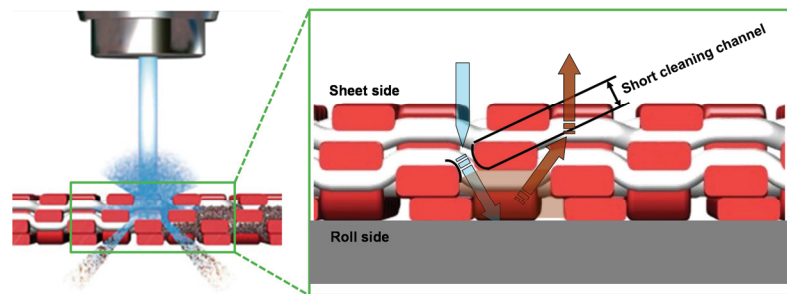


Figure 15. TamStar HS cleaning channels make high-pressure cleaning easier.

The permeability profile of the double cloth TamStar dryer fabric is even in the machine and cross machine directions, because the ratio of flat machine directional yarns is high in the fabric structure.

Figure 16 shows a permeability comparison of 1st and 2nd group dryer fabrics on a newsprint machine that runs at 4920 fpm (1,500 m/min). There are similar high pressure cleaning units in both sections, and both dryer fabrics were installed at the same time. After 170 running days, the permeability of the conventional dryer fabric had decreased by 20%, but the permeability of TamStar HS had decreased by only 10%. In addition, the permeability profile of TamStar HS is much more even.

Table 1 (next page) presents the comparative technical data for each member of the TamStar family, including structure, permeability, thickness and weight.

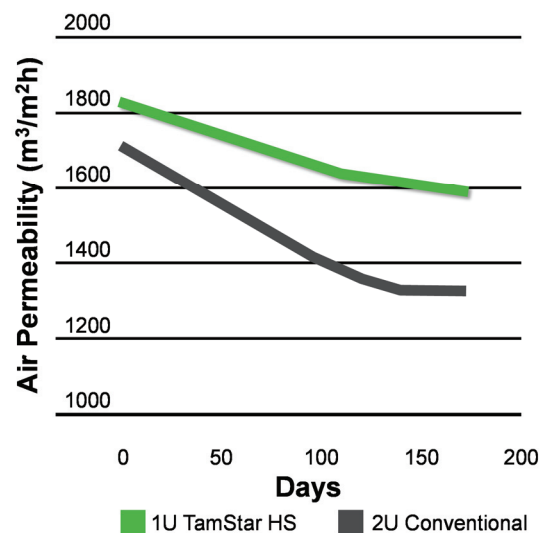


Figure 16. Air permeability follow-up between TamStar HS and a conventional dryer fabric.

TamStar technical data							
Structure	Double-cloth structure						
Yarns MD	Flat PET monofilaments						
Yarns CMC	Round PET monofilaments						
Air permeability (m ³ /m ² h)	1450	1750	2050	2400	3200	4200	5650
Air permeability (cfm)	90	110	130	150	200	250	350
Caliper (mm)	1.4	1.4	1.4	1.4	1.6	1.6	1.6
Weight (g/m ²)	1180	1150	1150	1130	1190	1140	1080

	TamStar HighSpeed				TamStar OS			
Structure	Double-cloth structure				Double-cloth structure			
Yarns MD	Flat PET monofilaments				Flat PET monofilaments			
Yarns CMC	Round PET monofilaments				Round PET monofilaments			
Air permeability (m ³ /m ² h)	1450	1750	2050	2400	1450	1750	2050	2400
Air permeability (cfm)	90	110	130	150	90	110	130	150
Caliper (mm)	1.3	1.3	1.3	1.3	1.6	1.6	1.6	1.6
Weight (g/m ²)	1150	1130	1100	1100	1300	1280	1260	1240

TamStar HighPerm			
Structure	Double-cloth structure		
Yarns MD	Flat PET monofilaments		
Yarns CMC	Round PET monofilaments		
Air permeability (m ³ /m ² h)	3200	4200	5650
Air permeability (cfm)	200	250	350
Caliper (mm)	1.8	1.8	1.8
Weight (g/m ²)	1250	1180	1140

Table 1. Comparison of TamStar Family

Reducing total fabric cost

Valmet's dryer fabrics are manufactured in two locations - at the Tampere plant in Finland and at the Tianjin plant in China. TamStar can be supplied from both locations to optimize delivery time and reliability.

In urgent needs, we can supply a fabric to a mill within 10-20 days. Through our fast delivery capability, the customers are able to reduce the number of fabrics in their inventories by one fabric per position. The running life of a dryer fabric is approximately one year, so the tied-up capital reduction saving is about 10% of the fabric price.

It has already been proven that the quality of Valmet's products made in China is as high as that of the products made in Finland. For customers, the total cost is thus almost the same regardless of the place of manufacture.

In the present situation, strong purchasing organizations tend to concentrate on comparing the purchase price only, instead of the total cost. When you additionally consider the fact that according to the statistics the Valmet fabrics run 15-25% longer than other suppliers' fabrics, it's difficult to understand why fabrics should be purchased based only on lower price.

TamStar

Designed to improve paper-making efficiency, this dryer fabric is suitable for all paper grades and ideal for high speed unorun and conventional positions. The TamStar dryer fabric combines a unique double cloth structure, which contributes to a long running life and improves paper machine runnability. Other valued key aspects of all TamStar fabrics include good runnability, elongation less than 1%, a very strong and non-marking warp loom seam and strong edges.

Benefits of TamStar dryer fabric include:

- Stable and durable double-cloth structure
- Low air carry
- Runs clean and easy to keep clean
- Very strong non-marking seam

TamStar OS

The latest fabric style in the TamStar family is the TamStar OS fabric (**Figure 17**). It falls between the HighSpeed and HighPerm in caliper and is designed to be strong and durable as an all-around unorun fabric for older paper machines.

Benefits of TamStar OS dryer fabric include:

- Stable double-cloth fabric for unorun sections
- Especially suitable
 - for liner and fluting machines
 - where 90-150 cfm fabric is needed
- Good high pressure cleaning properties
- High wear resistance
- Excellent runnability and small seam distortion
- High CMD stiffness prevents wrinkling

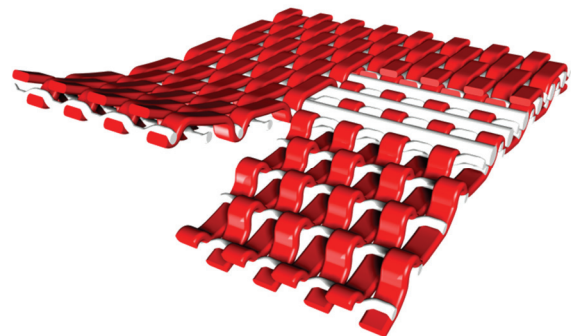


Figure 17. TamStar OS is a strong and durable fabric for older paper machines.

TamStar HighSpeed

The TamStar HighSpeed groove structure (**Figure 18**) features short and straight cleaning channels, which improve the high pressure cleaning effect and help to maintain air permeability. As a very thin and smooth fabric it improves paper machine runnability by enhancing sheet stabilizer performance.

Benefits of TamStar HighSpeed dryer fabric include:

- Smooth and dense
- Low elongation
- Flat back, minimum air carry
- Excellent high pressure cleaning with cleaning channels
- Excellent wear resistance
- Very strong non-marking seam



Figure 18. TamStar HighSpeed groove structure improves high pressure cleaning.

TamStar HighPerm

This dryer fabric is designed for double felted paper machine sections that require high air permeability and drying efficiency. The TamStar HighPerm has a modified machine side with high yarn floats (**Figure 19**) to create a thick boundary air layer, which is needed for improved pocket ventilation. The TamStar HighPerm also features the Slot Surface, which gives an unrestricted path for air flow through the fabric. This fundamental property minimizes the pressure drop through the fabric. To enhance drying efficiency, the sheet side is formed using flat yarns to produce excellent heat transfer.

Benefits of TamStar HighPerm dryer fabric include:

- High yarn floats on roll side
- Excellent heat transfer with high contact area
- Slot Surface improves pocket ventilation
- Excellent wear resistance
- Easy to seam

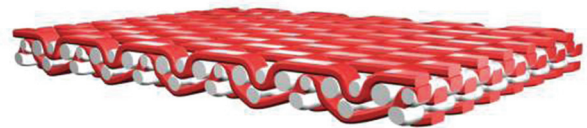


Figure 19. The TamStar HighPerm high yarn floats on the machine side improve ventilation.

Spiral fabrics supplement Valmet's dryer fabric offering

Just as the name implies, a spiral fabric is manufactured of spirals, supported with cross-directional straight yarns. The fabric is not woven on a weaving machine. Filler yarns inside the spirals adjust air permeability.

Valmet offers different spiral fabric (**Figure 20, next page**) applications for unrun groups and double-felted groups, and for positions that require improved or excellent heat resistance or improved performance against contamination - always according to the specific needs of each customer.

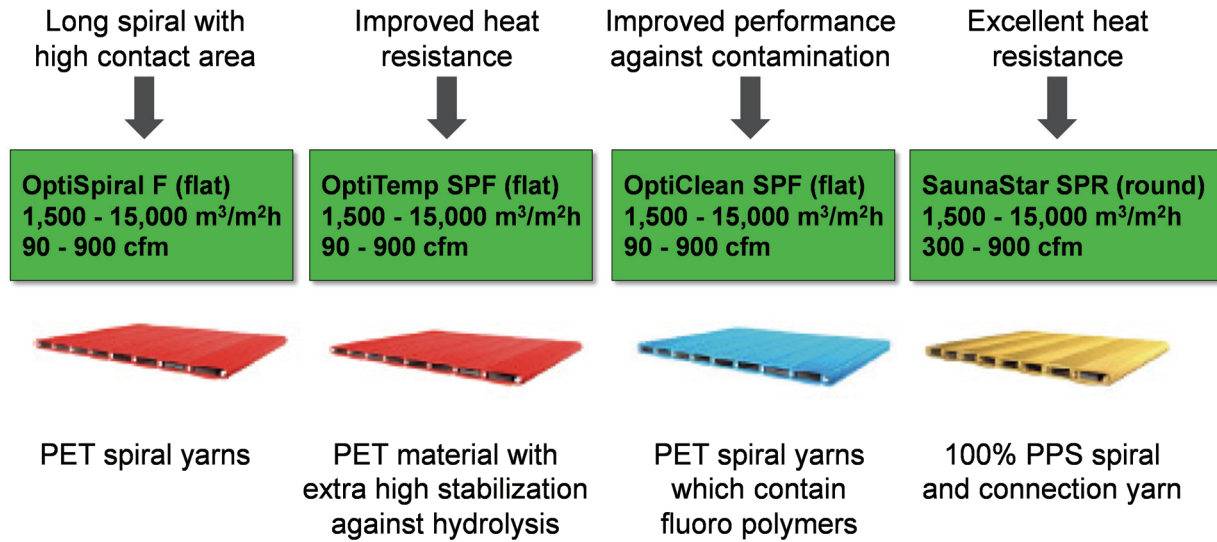


Figure 20. Valmet spiral fabrics have received very positive feedback from mills.

Improvements to traditional spiral fabrics

Compared with a woven dryer fabric, a spiral fabric offers various advantages. It stays more open longer and has more wear potential. A spiral fabric also tolerates distortion and adapts to misaligned rolls better than a woven fabric.

"Additionally, a spiral fabric is better at handling problems, such as paper wads, since the fabric is stronger than the seam of a woven dryer fabric," Valmet's Product Manager points out. "And as the 'seam' is the same as the rest of the spiral fabric, there is, of course, no seam area wearing."

Although spiral fabrics in general are nothing new on the market, Valmet's innovative products feature some major improvements.

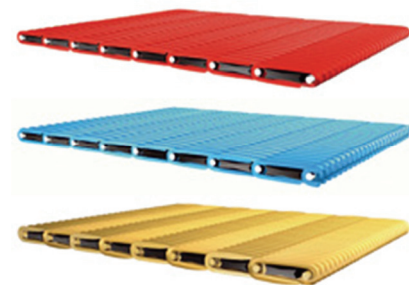


Figure 21. Spiral fabric special applications supplied by Valmet

	Valmet Spiral	Standard
Spiral monofilament	0.43 x 0.70	0.43 x 0.70
Spiral size	6.75 x 1.80	5.20 x 1.80
Contact area	37%	27%

Table 2. High contact area gives better sheet support and heat transfer.

The relatively thick traditional spiral fabrics carry a lot of air, which is only beneficial if the amount of evaporated water is high. Therefore, the spiral yarns used in the OptiSpiral family are long and flat. A clearly larger contact area improves heat transfer and consequently lowers steam consumption (Table 2).

Also, non-twisting dog-bone-shaped filler yarns are more durable against high-pressure

showers than traditional filler yarns. Since this new filler yarn design does not have sharp or thin edges that are prone to cracking, all high-pressure cleaners can be freely used (Figure 22).

Valmet fabric services

In today's difficult economic times, the partnership between Valmet and select paper mills has become even more important. The strong link - based on the mills' experience, the close relationship and the technical cooperation - helps a lot in facing the crisis together. For example, very good results have been reached in reducing the number of clothing failures and machine breaks as well as in increasing the lifetime of clothing at mills.

Available fabric services include:

- Speed difference measurements
- Startup support
- Troubleshooting, advisory and laboratory services
- Section-specific services such as drainage and vibration measurements

Case Study: Fabric stretcher maintenance program delivers quick payback

One key element in the overall operation of paper and board machines, the importance of which is often overlooked in the paper and board manufacturing process, is the flawless operation of fabric stretchers.

The best way to ensure the trouble-free operation of one's fabric stretchers is to sign up for Valmet's stretcher maintenance program. This maintenance program includes stretcher condition testing, Sisu hydraulic motor maintenance and upgrade services, and the calibration of stretchers.

The purpose of condition testing is to determine the mechanical condition of stretchers and motors, detect possible leaks, and to determine the actual tension of fabrics. Sisu 34 A hydraulic motors are fully factory-reconditioned under the maintenance program. The upgrade service brings Sisu 30 A hydraulic motors up to the 34 A standard. The most significant difference between these two models lies in the motor's brake mechanism. The 30 A model features a band brake outside the motor housing, which is susceptible to dirt and requires recurring adjustments that take extra maintenance hours. The torque of the band brake varies depending on these adjustments and the wear of the band, and its response time is too long at malfunctions. Model 34 A employs a vane brake inside the motor housing, which provides a constant level of torque and fast braking action.

The purpose of fabric stretcher brakes is to facilitate the controlled shutdown of the dryer group in connection with a malfunction where the stretchers lose hydraulic pressure. An uncontrolled shutdown may cause the dryer fabrics to drift up against the dryer section frame and get damaged beyond repair. Stretchers are always calibrated after motor upgrades and maintenance to optimize fabric tensions.

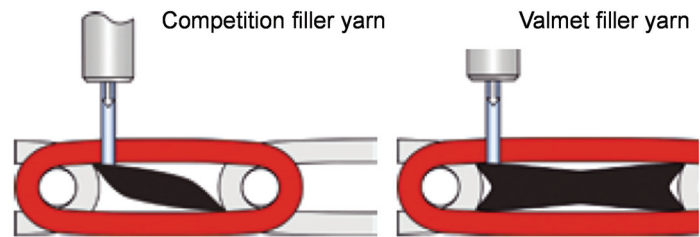


Figure 22. High pressure cleaning: Valmet's "Dog Bone shaped" filler yarn does not have sharp edges prone to fragmentation. Therefore OptiSpirals can be freely used with all HP-cleaners with maximum pressure.

A fabric stretcher maintenance program was carried out on PM3 at a Scandinavian mill in Finland whereby all Sisu 30 A hydraulic motors were upgraded to 34 A motors. The mill's chief foreman for PM3 remembers: "We lost six dryer fabrics [last year] due to slow braking and uncontrolled shutdowns. No dryer fabrics have been lost because of brakes during [the two years] after the motors were upgraded. The payback time on the hydraulic motor upgrades has been roughly one year." He continues: "We also try to have [Valmet] test the condition of our stretchers on an annual basis. This testing lets us check the true fabric tension and the condition of the stretchers. The testing report is a good tool for tracking the status of the stretchers. The hysteresis graphs, for example, provide direct information on stretcher frictions."

The upgrading and servicing of Sisu hydraulic motors is based on exchange units. Customer mills send motors in need of servicing to Valmet and Valmet replaces them with factory-reconditioned motors. This facilitates fast turnaround times on hydraulic motor service and upgrade orders.

Case Study: Brown paper manufacturer uses Valmet fabric services

A purchaser at a brown paper and packaging mill stated that their cooperation with us started with the erection of their new machine in 2006. They particularly appreciated our ability to listen to mill personnel and our capacity to meet their requests. Additionally, the purchaser said that "[Valmet's] offer included all the key points we wanted: help in training our inexperienced staff, help in the start-up, and a start-up team for the pre-start-up, start-up and post-startup periods. Little by little, through gaining experience, [Valmet's] support has turned to help in improving our process." Consequently, Valmet became their almost exclusive supplier of fabrics.

At this mill Valmet provided technical support to help the paper machine crew. The main goals have been to follow clothing performance to better understand the new machine, to help reduce the number of clothing failures, and to optimize the clothing lifetime on the machine to lower the cost of paper per ton.

The huge measurement database, which Valmet has built up since 2005, is a very good tool in detecting if something is not working on the machine. The trends received from the measurements are very reliable due to the large amount of data. According to the mill line manager, "[Valmet's] strength lies in its technical service: high frequency, good reactivity and trial follow-up." She continues, "The most important things for me in our cooperation are the regular routine surveys and benchmarking. A strong cooperation should be stable throughout the year, not getting a high service level during the first months and nothing thereafter. [Valmet] has been able to offer stable cooperation."

Twice a year, the mill management and Valmet people organize a technical meeting to follow up the newest improvement steps, to discuss the latest mill technical issues, and to define new targets. This helps in discussing technical improvements, planning the trials, and collecting the results.

"[Valmet] is a good listener and has high technical expertise in paper machines, which makes our discussions constructive and efficient. [Valmet] works in a reliable and rigorous way, so they have gained our trust fairly quickly," adds the Paper Machine Manager.

Summary

The secret of TamStar's long lifespan lies in its double layer structure, which contributes to excellent wear resistance. Thanks to TamStar's large contact area, heat transfer is also very efficient. Its strong and non-marking warp loop seam better withstands wear without weakening or fraying. The fabric's reinforced edge is flexible and strong and it is easy to keep clean.

All Valmet fabrics are tailor-made to each customer's specific needs. Our fabrics are developed hand in hand with our machines, as each forming, press, and dryer position entails its specific product design requirements. In addition to the above benefits, you will see the results in improved runnability, predictable performance and energy saving.

This white paper combines technical information obtained from Valmet personnel and published Valmet articles and papers.

Valmet provides competitive technologies and services to the pulp, energy and paper industries. Valmet's pulp, paper and power professionals specialize in processes, machinery, equipment, services, paper machine clothing and filter fabrics. Our offering and experience cover the entire process life cycle including new production lines, rebuilds and services.

We are committed to moving our customers' performance forward.