

Expectations Of Paper Makers From The Clothing Suppliers For Efficient Drainage And Good Printability

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ABSTRACT

With the present trends of higher paper machine speeds, lower basis weight, higher printing press speeds and better quality demands of print media, the paper makers have a challenging task to produce quality paper at competitive cost. Today, paper machine clothing is expected to fulfill many functions than merely conveying or dewatering the sheet safely through the paper machine. An objective high on the list of priorities of mills is for machine clothing to run efficiently with little or no downtime. For a mill to achieve maximum efficiency from its clothing investment, selection of clothings, good operating practices and procedures are of utmost importance.

In this paper, we share the experience in our mill with different design of clothing and its impact on the quality of paper. Further, the expectations of the paper makers from the clothing suppliers` for efficient drainage and good printability are discussed.

Introduction

Good printability, excellent visual characteristics and optimal running at printing press are the essential requirements for quality paper. The worldwide trend to higher paper machine speeds, lighter basis weight, higher printing press speeds, higher quality demands on advertising and the use of four color printing on both sides of the sheet makes paper making challenging from the point of view of producing quality paper at competitive cost.

The key paper properties which ensure good printability and trouble free runnability at printing presses are:

- Uniform Basis weight and Caliper
- Uniform formation
- Minimum two-sidedness with respect to shade and smoothness
- Adequate strength and surface properties
- Dimensional stability
- Uniform shade
- Absence of surface defects.

We all know that all these key paper properties are greatly influenced by quality of forming fabrics, press felts and dryer screens. In this regard, we present our experience of different clothing on our high speed Paper machine #5.

Briefly, PM#5 comprises of (GA Drawing slide to be included)
Make : VOITH

*Seshasayee Paper & Boards limited,
Erode-638 007, (T. N.)*

Head Box : Hydraulic
W type with top lip Anti-deflection control
Wire Part : Duoformer F
Press Part: Duo-centri II with Suction Pick up, Suction Press, PU covered CC rolls in I and III nip position.

Dryer Part:
I group : 5 cylinders Unirun
II group: 6 cylinders Unirun
III group: 6 cylinders Conventional top & Bottom
IV group: 6 cylinder Conventional Top & Bottom
V group: 8 Cylinders Conventional Top & Bottom
Post Film-press Cylinder: Alloy unfelted
VI group: 10 cylinders Conventional Top & Bottom with separate Steam & Condensate header.
Speed Sizer: Voith Film Press
Calendar: Single stack with singly nip CI rolls
Pope reel: Grooved drum with Primary & Secondary arm.
Hood & Ventilation: Closed Hood with PV system
Automation: ABB DCS - Advant station 500 series
QCS Accuray 1190 version.

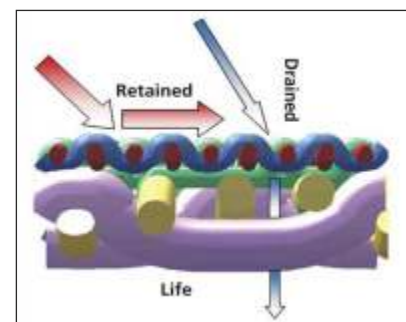
GSM Range : 45 to 140 GSM
Machine Speed : 400 to 950 mpm
Products : Wood free Printing & Writing Paper
Surface sized Map litho paper
Pigment Coated Paper
Copier Grades
Coating Base Paper

Average Production: 180 tpd
Furnish : 70 % - 80 % - Captive Bleached Hardwood Pulp (ECF Bleached)
20 % - 30 % - Captive Chemical Bagasse Pulp (ECF Bleached)

The products of this machine are mostly used by quality printers all over India and abroad. We use both Double layer fabric and Triple layer (Imported) forming fabrics in Duoformer section.

Forming Fabric

The forming fabric should basically ensure high retention, extended life and good drainage. Forming fabrics have a greater effect on final paper properties than press and dryer fabrics.



Specifications of Forming Fabrics in use:

In Triple Layer fabric, we see following advantages

- Thanks to higher FSI, better retention and less web breaks.

SPECIFICATIONS OF TOP FABRIC

SI No	Description	Double layer	Triple layer
1	Warp Diameter	0.17 mm	0.13 mm
2	Weft Diameter	0.20 mm (top) 0.13 mm (support shute) 0.27 mm (bottom)	0.13 mm (top) 0.13 mm (support shute) 0.27 mm (bottom)
3	Air Permeability	371 cfm	465 cfm
4	Fiber Support Index	135	157.1
5	Caliper	0.77 mm	0.85 mm
6	Total Mesh(per cm)	63 X 55	57 X 48
7	Drainage Index	35	37.8

SPECIFICATIONS OF BOTTOM FABRIC

SI No	Description	Double layer	Triple layer
1	Warp Diameter	0.17 mm	0.13 mm
2	Weft Diameter	0.20 mm (top) 0.13 mm (support shute) 0.27 mm (bottom)	0.13 mm (top) 0.13 mm (support shute) 0.30m (bottom)
3	Air Permeability	366fm	370m
4	Fiber Support Index	133	170.4
5	Caliper	0.75mm	0.90 mm
6	Total Mesh (per cm)	60 X 54	57 X 54
7	Drainage Index	33	33.8

PROPERTIES Vs DIFFERENT COMBINATIONS OF FORMING FABRICS

Top Fabric	Double layer	Double layer	Triple layer	Triple layer
Bottom Fabric	Double layer	Triple layer	Double layer	Triple layer
Overall Fiber Retention	65 – 67 %	68 – 70	67 - 69	68 – 72 %
Smoothness – Top	180 – 220	180 – 200	170 – 190	160 – 180
Smoothness - Bottom	100 – 130	100 – 120	110 – 130	100 – 110
Wax Pick	12 A	12 A	12 A	12 A
Dryness after Press	46 – 47 %	45 – 47 %	45 – 47 %	45 – 46 %
Ash content	16.0 %	16.0 %	16.0 %	16.0 %
Overall Filler retention	32 – 34 %	34 – 36 %	34 – 35 %	36 – 37 %
Fines carrying with Top wire	Low	Moderate	Moderate	High

- Extended life due to higher Caliper of fabric and more diameter of bottom weft.
- Good drainage.

But some times, we faced the high moisture after couch and fines throw towards top wire. To avoid these issues, we tried following combinations for Top and Bottom positions:

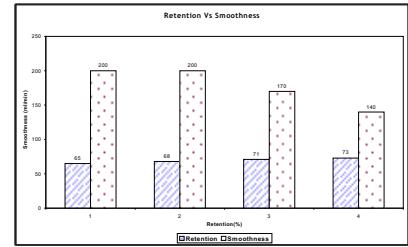
- Double layer and Double layer
- Double layer with Triple layer
- Triple layer and Triple layer

For different forming fabric combinations, the properties and retention achieved in 60 GSM at 810 mpm are as follows:

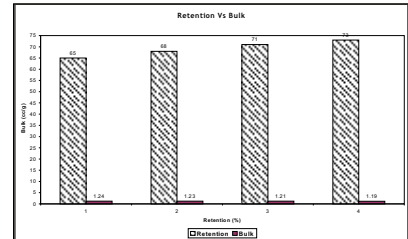
BENEFITS OF HIGH RETENTION

SI No	High Retention	Low Retention
1	Improved runnability of machine	Poor runnability of machine
2	Better Drainage	Poor Drainage
3	Low contaminant in the system	High contaminant in the system
4	Reduces fiber & chemical cost	Higher additive costs
5	Effective usage of expensive chemicals	More deposits of chemicals
6	Low sewer loss.	High sewer loss.

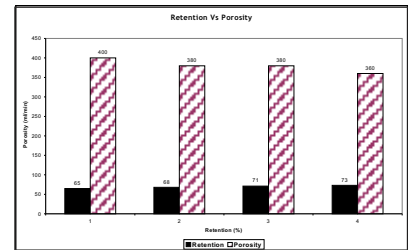
PHYSICAL PROPERTIES Vs OVERALL RETENTION



RETENTION Vs BULK



RETENTION Vs POROSITY



Press Felts

We are using the Multilayer Batt-on-Mesh Laminated felt for Pick up and 3rd Press position

As felts are pre-compacted, not much time is required to get compaction with new felt.

As can be seen, the performance of imported press felts is superior with respect to Off-Press dryness, better runnability and extended life.

Dryer Screens

The Air permeabilities of dryer screens are:

- 1st Unirun : 95 cfm
- 2nd Unirun : 110 cfm
- 3rd Group : 150 cfm
- 4th & 5th : 250 cfm
- 6th Group : 250 cfm

SPECIFICATIONS OF PRESS FELTS

SI No	Description	Supplier A	Supplier B
PICK UP FELT			
1	Layer	Laminated single layer over double layer	2+3+2 layer
2	GSM	1530	1553
3	Air Permeability	48 – 53 cfm	27 – 29 cfm
1ST PRESS BOTTOM FELT			
1	Layer	Double layer base	2+2+2 layer
2	GSM	1250	1278
3	Air Permeability	55 – 61 cfm	56 – 59 cfm
3RD PRESS TOP FELT			
1	Layer	Laminated base with fine top	2+4+2 layer
2	GSM	1480	1520
3	Air Permeability	37 – 43 cfm	24 – 26 cfm

COMPARATIVE PERFORMANCE

SI No	Description	Supplier 1 (Imported)	Supplier 2 (Indigenous)
1	Off-Press Dryness	44 – 46 %	41 – 43 %
2	Steam demand/t	2.3 – 2.4 t	2.5 – 2.7 t
3	Life (days)	30 – 35 (Pick Up) 40 – 45 (Bottom) 30 – 36 (Top)	25 – 29 (Pick Up) 28 – 30 (Bottom) 25 – 28 (Top)

For Uni-run groups, we use imported screens to contain sheet fluttering. For Conventional group screens, we use both Imported and Indigenous screens. Indigenous screens are comparable in steam demand. The difficulties with the indigenous screens are relatively short life and mounting delays. Seaming time for indigenous and imported screens are 1 ½ hour and half-an-hour respectively. But for seaming delays and relatively short life, indigenous screen performance is satisfactory. (No screen mark, No edge damages, no slack edges and fluttering of screens, thus avoiding moisture variations across deckle of sheets).

The Expectations From Clothing Suppliers

To meet the challenges of today's print media, paper makers look for the following from machine clothing manufacturers.

A) Forming Fabric

- The forming fabric should stay flat during web formation throughout the life span. For good profile

quality, the fabric should not curl on the edge and no ripples should be visible between wire rolls.

- The forming fabric design should ensure good retention of fines and fillers in the web.
- The surface of fabric should be smooth to minimize fabric marking resulting from the knuckles of the yarns.
- The fabric should retain its drainage characteristics throughout life span.

B) Press Felts

- Requisite felt compaction should be over within 8 to 12 hours.
- In order to maintain target dryness off-press throughout span of felt life, felts should stay open and not choke after 2 to 3 weeks.
- The wear of felt surface should be even.
- Fiber shredding from felt should be minimum.
- Felt edges should be properly treated to ensure trouble free guiding.

C) Dryer Screens

- The screen design should ensure dimensional stability and minimal choking.
- The screen should remain flat throughout its life span.
- There should not be any marking on paper.
- The screen air permeability to be maintained uniform across the width throughout the life span.
- Good Edge sealing should be ensured to avoid breaks due to loose strings and guiding issues.
- Post dryer screen seam should be hydrolysis resistant to avoid failure of seam.

Conclusions

Certainly, we see distinct improvements in quality of indigenous clothing manufacturers. With constant interaction and follow-up, we are confident that indigenous manufacturers will be able to meet the requirements of paper makers and help them in producing quality paper at competitive cost.

Acknowledgement

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