

# PAPER TECHNOLOGY INTERNATIONAL

THE JOURNAL OF THE BIOFOREST PRODUCTS SECTOR



## PITA PAPER *matters!* 2018 Conference & Exhibition at Lancaster University

Forming: Are contaminants an issue?

Hamish Parsons (Heimbach)

# PAPERmatters 2018!

## The Presentations

### Hamish Parsons

#### Heimbach



Hamish graduated from the University of Tasmania with a degree in Mechanical Engineering and began his professional career working for Australia Paper in 1992. In 1997, and as part of his on-going training programme with Australia Paper, he spent 12 months at Beloit Walmsley in the UK where he gained sufficient experience to help commission one of the last full machines Beloit manufactured. Hamish remained with Australia Paper – by then known as Amcor – for a further 3 years, before returning to the UK, where he re-joined Sandusky Walmsley ( formerly Beloit Walmsley ) to work in the technical troubleshooting / design department.

In 2005, Hamish joined the Paper Machine Clothing Industry in the role of Product Manager at Heimbach UK Ltd. Soon afterwards he re-located to Singapore to assist in the set-up, support and growth of sales into the growing Asia markets. He returned to Heimbach UK in 2013, this time promoted to the position of Strategic Manager – Forming, where he manages the full product line, with the goal to ensure that Heimbach always has the right product – today and in the future.

Hamish is settled in the UK now as a family man with his wife, Johanne and two sons.

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## PITA – Forming, contaminants??

Lancaster, Sept 2018, Hamish Parsons

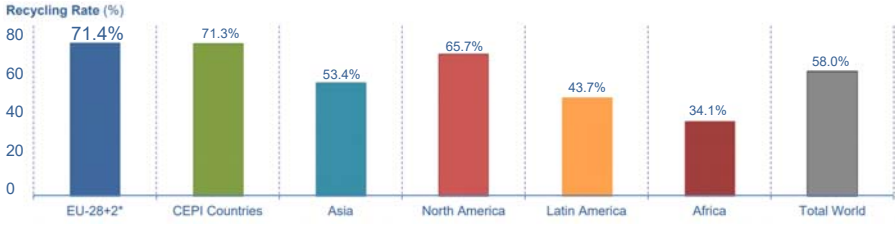


## PITA – Are contaminants an issue

Secondary Fibre significance



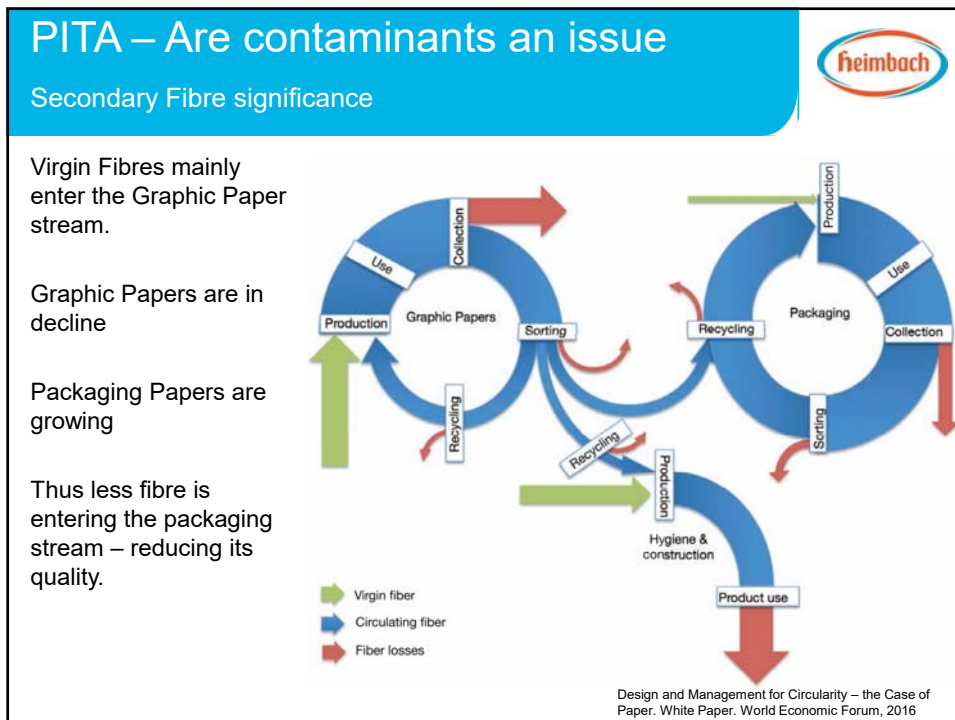
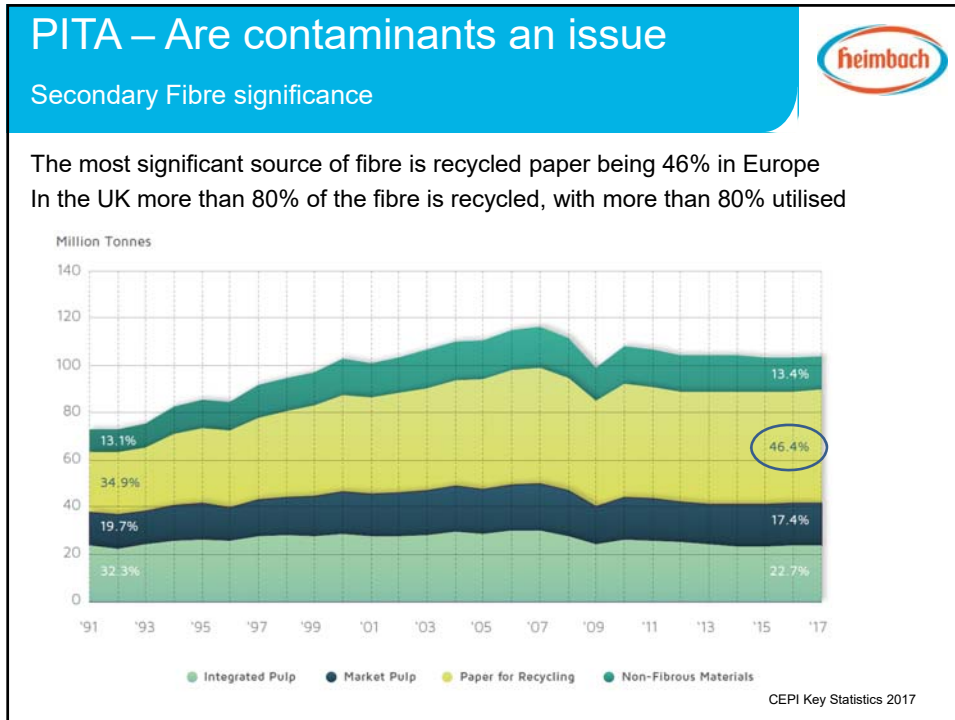
- Global production of paper and board 2015: 406 million tons
- Global utilization of *paper and board for recycling* 2015: 237 million tons
- Global recycling rate: 58 %
  
- Europe 71.4%



Region	Recycling Rate (%)
EU-28+2*	71.4%
CEPI Countries	71.3%
Asia	53.4%
North America	65.7%
Latin America	43.7%
Africa	34.1%
Total World	58.0%

CEPI Key Annual Statistics 2015





## PITA – Are contaminants an issue

Current Furnish Types - Packaging




Main Furnish Types

- **Old Corrugated Containers (OCC),**
  - > 90% recovery rate – previously recycled
- **Mixed paper:**
  - 45 to 50% recovery - some virgin fibre – high contamination
- Packaging grades mainly use OCC with small amounts of mixed waste
  - Minimal virgin entering stream
  - Fibre Quality deteriorating world wide for packaging




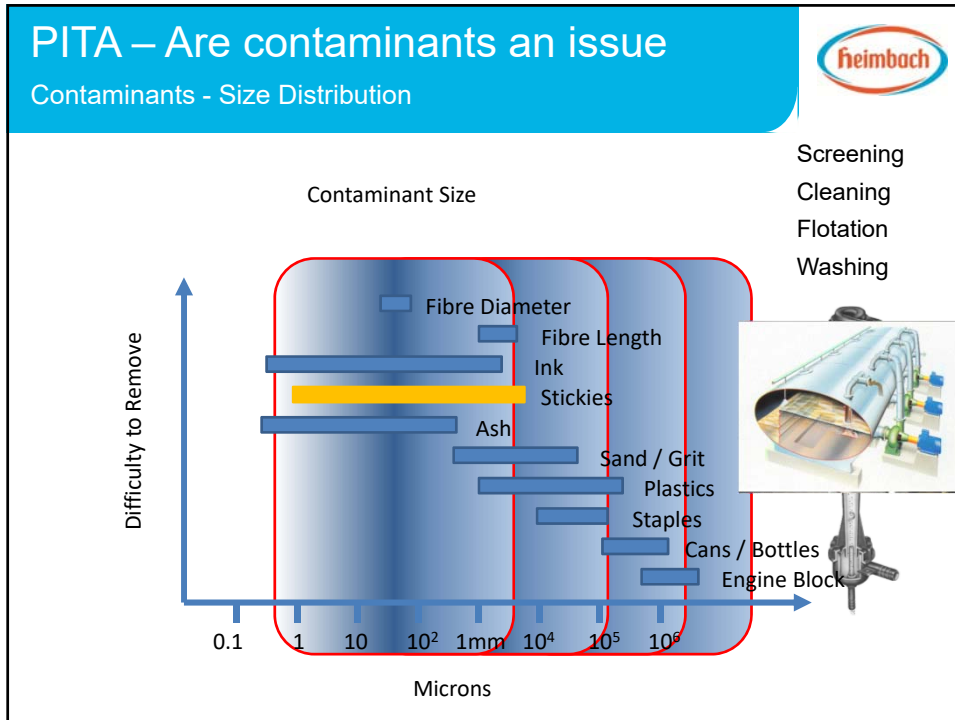

## PITA – Are contaminants an issue

Contaminants, either removed – or enter the paper machine.



- Large Junk – Heavy Weight and Coarse
  - *nuts, screws, foil, cans*
  - *plastics: films, bags, envelopes*
  - *dirt, cloth, yard waste, leather, etc.*
- Inks & toners
- Stickies - *most difficult problem currently*
- Coatings – *can appear as white / coloured chips*
- Wax Coatings – *present in some boxes*
- Fillers – *damaging to the tissue creping process, reduce strength in board*
- Papermaking additives – *dyes, wet strength agent*





### PITA – Are contaminants an issue

Contaminant Volume - Should Packaging mill wash more?

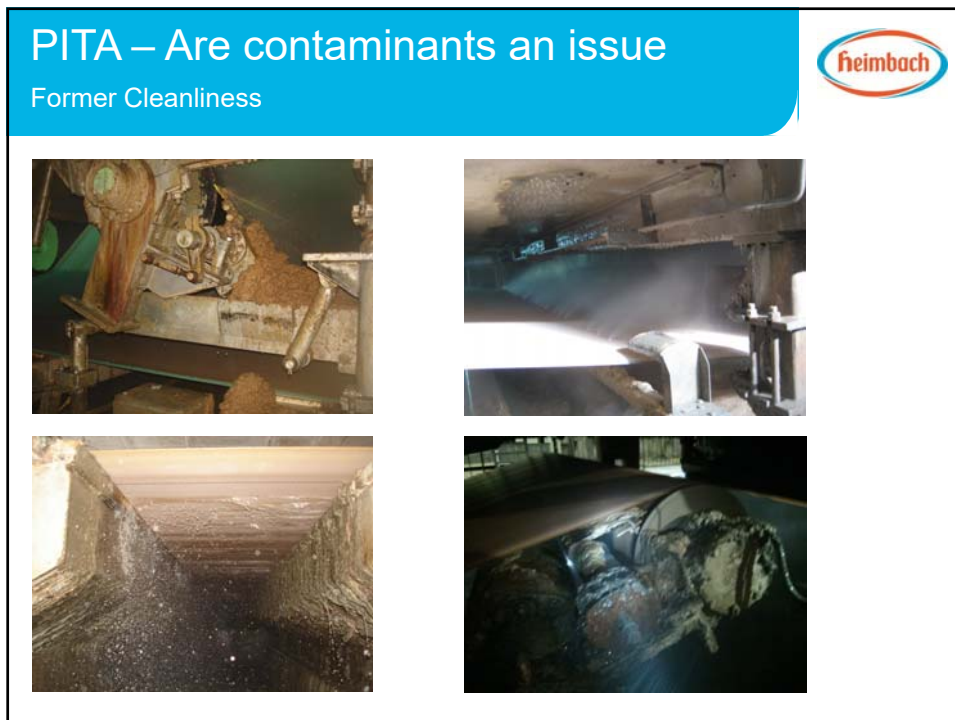
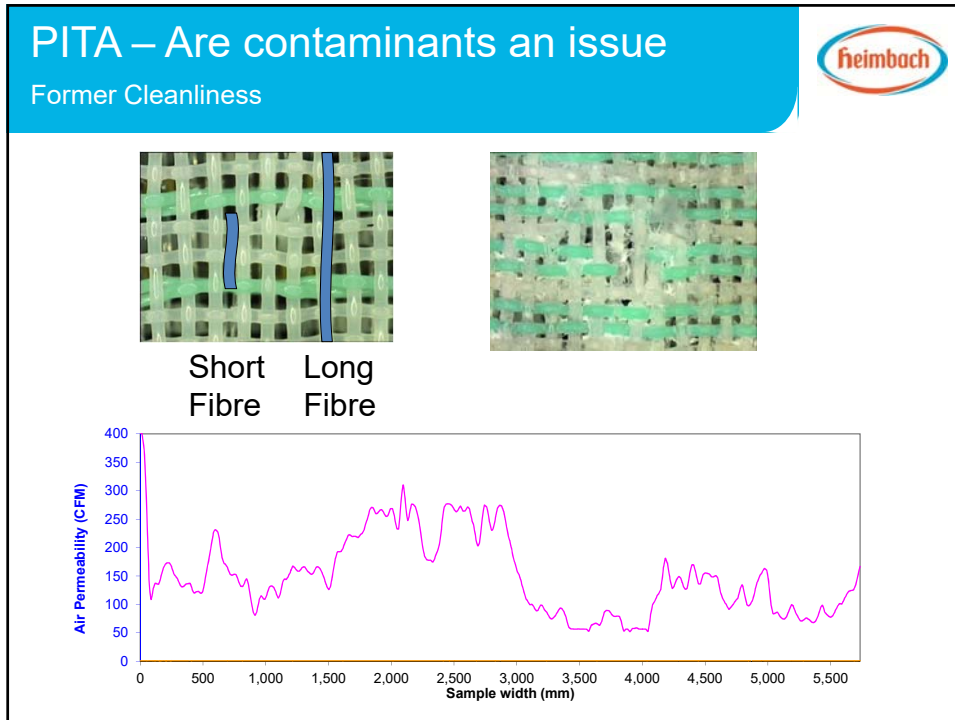
Paper Produced	Recovered Paper Grade	Amount of Total Waste	Amount of Waste [% by dry weight]			
			Rejects		Sludges	
		% by dry weight	Heavy weight & coarse	Light weight and fine	Flotation deinking	White water clarification
Liner, Fluting	Mixed Waste, Old Corrugated Cartonboard	4-9	1-2	3-6	-	0-1
Board	Mixed Waste, Old Corrugated Cartonboard	4-9	1-2	3-6	-	0-1

Fibre Quality effect over time

Question: Packaging grades are commonly chasing sheet strength whether it be Concora or Ring Crush – Rejects are low in these grades.

Would it be viable to remove more ash by washing – increasing strength, reducing breaks? Breaking the cycle?


- Fabric Lives decrease




**PITA – Are contaminants an issue**  
 Continuous conditioning of Forming Fabrics





**PITA – Are contaminants an issue**  
 Continuous conditioning of Forming Fabrics






Laminar water jet



Turbulent water jet



Fibrillation

A turbulent jet, one that disintegrates into single droplets before impinging the surface is much less efficient at cleaning the fabric and could damage the fabrics. Turbulent jets can cause the strands to vibrate quite intensely causing the strands to wear at the cross-over points and leading to fibrillation.



**PITA – Are contaminants an issue**  
 Continuous conditioning of Forming Fabrics

The diagram illustrates two configurations for water jet conditioning of forming fabrics. The 'Usual layout' shows a water jet directed between two return rolls. The 'Variation' shows a high-pressure (HP) water jet directed at the fabric return roll, with a high-density (HD) water jet also shown impinging on the fabric surface.


**PITA – Are contaminants an issue**  
 Continuous conditioning of Forming Fabrics

The 'High Pressure Shower' diagram shows a shower head positioned above a fabric moving to the left. The angle of the water jet is indicated relative to the fabric's direction. The photograph shows a close-up of water jets with a green box highlighting the angle, labeled as  $90^\circ + 10^\circ$ .

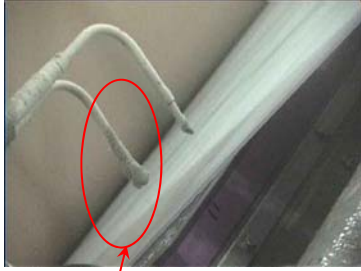
The jets should generally be positioned in such a way that the water jets impinge onto the fabric surface at an angle of  $90^\circ$  plus  $10^\circ$  in the run direction. If the angle of the water jets is much greater than this it can result in reduced cleaning performance, due to a smaller difference between jet and fabric speeds.

## PITA – Are contaminants an issue

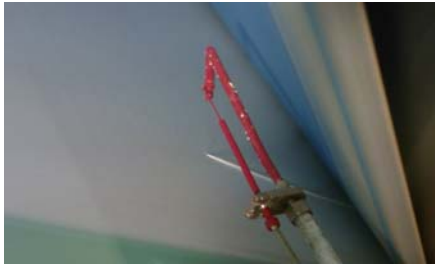
Trim Jet



The operation of two, single jet nozzles are not recommended, as the first trim nozzle may create a certain amount of fibre and mist, which can collect on the second nozzle, disturbances and sheet breaks may result.




Deposit on second nozzle, created by the first nozzle



Nice and Clean

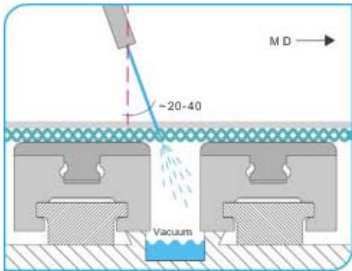
## PITA – Are contaminants an issue

Trim Jet set up

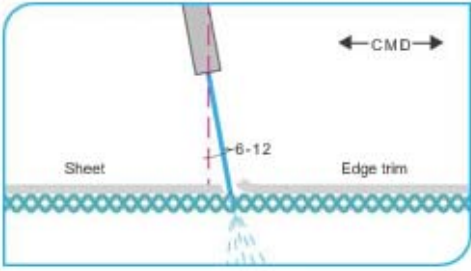


The water jet in the machine direction should be between 20 and 40° from the vertical on the fabric). This oblique positioning reduces the bounce back effect of the water and with it the generation of fibre mist.

At the same time it is recommended to position the nozzles also slightly obliquely in the cross direction about 6-12 ° so that the jet is directed towards the edge trim. In this way the cut edge of the edge trim so the sheet itself receives a smooth, clean cut edge and remains attached to the fabric.



Water Jet obliquely in MD



Water Jet obliquely in CMD

## PITA – Are contaminants an issue

Press Release Documents



## PITA – Are contaminants an issue

Fabric Design – fibre and water carry




SSB Design

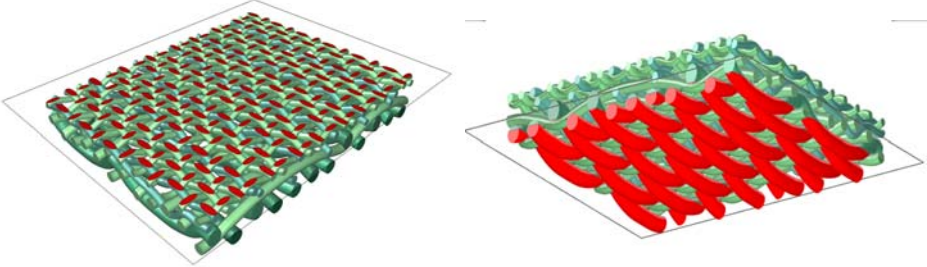
Modified Design – Single Binder

## PITA – Are contaminants an issue

Paper and Machine Side – fabric requirements




Paper Side – For paper formation, smoothness and retention of fibers, fillers and ash the support points on the paper side are important – Through time the development of the paper side surface has been a major influence on development of new designs



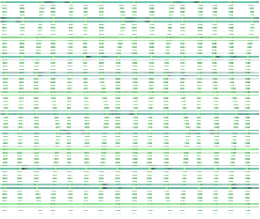
Machine Side – The volume of material (highlighted in red) on the machine side of the forming fabric is designed to be worn away. The more volume the higher the lifetime on the paper machine.

## PITA – Are contaminants an issue

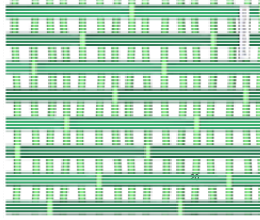
Forming Fabric Evolution – single layer

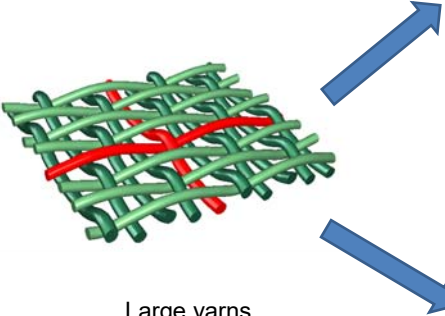


Small yarns  
- Good for Formation  
- Poor for life potential



Large yarns  
- Poor for Formation  
- Good Stiffness and life potential







**PITA – Are contaminants an issue**  
 Forming Fabric Evolution – SSB – Sheet Support Binder

*Paper Side Single Layer*  
 Small CD yarns      Small MD yarn

*Machine Side Single Layer*  
 Larger CD yarns for Life Potential      Larger MD Yarn for elongation

**PITA – Are contaminants an issue**  
 Forming Fabric Evolution – SSB – Sheet Support Binder


All yarns have a use for the papermaker with the exception of the Binding Yarn

Binding of Layers - Pair of Yarns

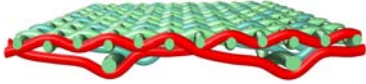
- Only one on the surface at one time
- Half of the yarns are filling up the structure unnecessarily.

*Paper Side Single Layer*  
*Machine Side Single Layer*

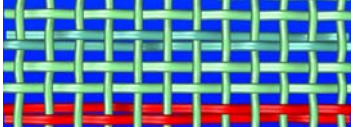
**PITA – Are contaminants an issue**  
 Unnecessary Yarns Removed – Single Binder



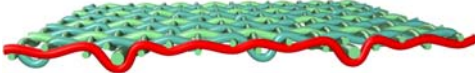
SSB – Pair of binding yarns



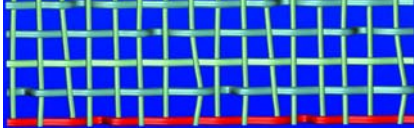
All yarns are used by the papermaker with the exception of the Binding Yarn



Development – Single Binder




All yarns are used by the papermaker with the CD yarn binding, as well as being used for Fibre Support – Nothing is redundant

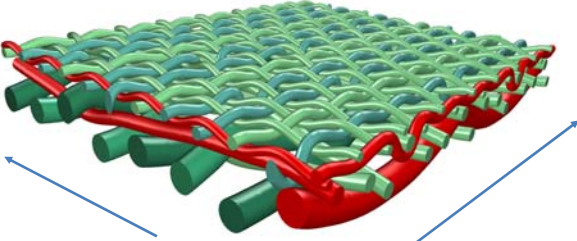


**Unnecessary Yarns are removed with a Single Binder, a *lean* approach keeping the structure more open.**

**PITA – Are contaminants an issue**  
 Unnecessary Yarns Removed – Totally Lean



Single Binder Concept  
Totally Lean



**Machine Direction**

- Paper Side Yarn for Fibre Support
- Machine Side Yarn for MD Stiffness (Reduce Elongation)

**Cross Direction**

- Paper Side Yarn for binding and Fibre Support
- Machine Side Yarn for Wearing Volume

### PITA – Are contaminants an issue

Single Binder – Cleaner Running

Binding Yarns in SSB makes construction thicker!

Single Binder makes construction thinner

Low Caliper

**Offset machine direction yarns make the fabrics thinner (10%) requiring less time for water removal. The offset yarns inhibit fibres from passing through the fabric.**


### PITA – Are contaminants an issue

High Resistance to Internal Wear









High Resistance to Internal Wear

## PITA – Are contaminants an issue

Internal abrasion customer example




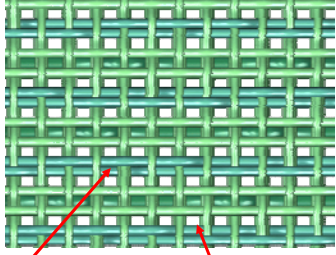
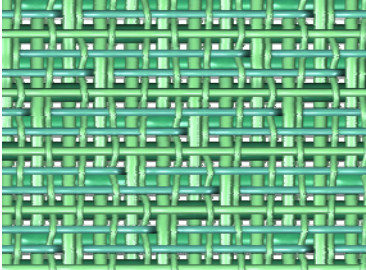
Primoselect vs primobond

<p>SSB - primobond after 43 days (Pair of Binders)</p>  <p>PS Primary CD</p>  <p>PS Warp MD</p>  <p>MS Warp MD</p>  <p>MS CD</p>	<p>Primoselect after 57 days (Single Binder)</p>    
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## PITA – Are contaminants an issue

Single Binder – Cleaner Running



<p>SSB – Pair of binding yarns</p>  <p>Fibres Caught in fabric</p> <p>Contaminants / fibres pass through fabric easily, carried around loop</p>	<p>Replacement – Single Binder</p>  <p>Single Binder – no pairs of binders for fibres to catch, no easy path through. Fibres and fillers go with sheet.</p> <p>Cleaner running.....</p>
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## PITA – Are contaminants an issue

Cleanliness – Both Packaging and Graphic Machines



In Pictures




SSB Design





Modified Design – Single Binder




## PITA – Are contaminants an issue

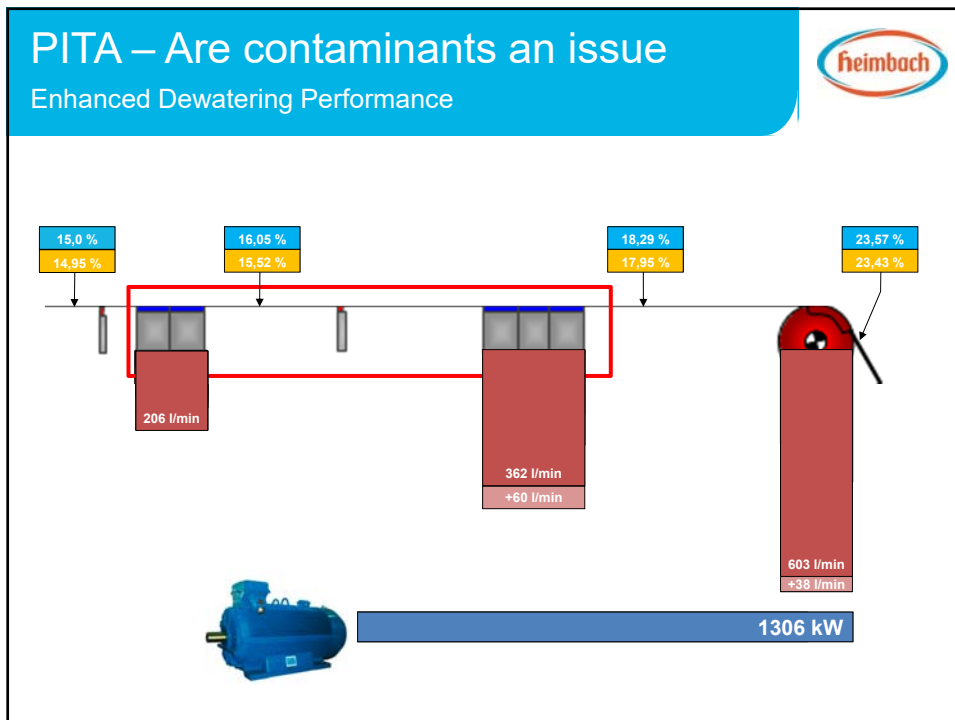
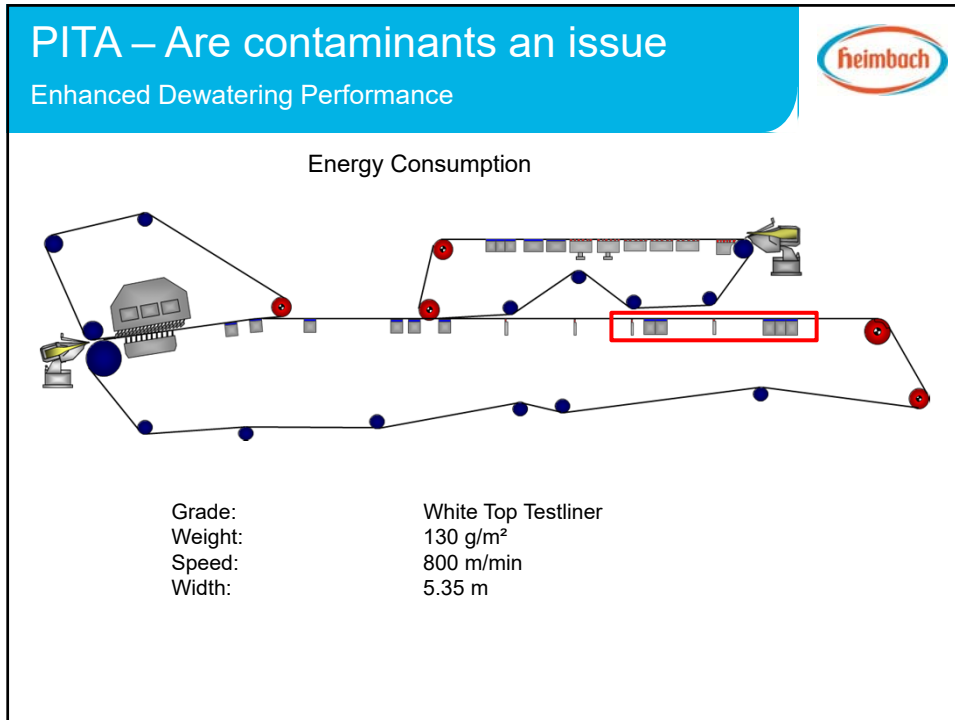
Single Binder – Additional Benefits / options



**Additional Benefits**

- increased drainage capacity and ex-couch dryness (specific drainage resistance reduced)
  - Low Caliper
  - Low Void Volume
  - High drainage area
- Improved internal abrasion
- Highest Life options available
- patent secured concept

Product	Machine Side	Containerboard		Fluting		Linerboard		High Speed Board
		Outer Plies	Filler Ply	Fourdriner	Gap Former	Printing Ply	Other plies	
Primoselect .HD (Heavy Duty)	8 shaft	✓	✓	✓	✓	✓	✓	✓
Primoselect.F (Fine)	8 Shaft	✓	✓	✓	✓	✓	✓	✓
	12 Shaft	✓	✓	✓	✓	✓	✓	✓
Primoselect.SF (Super Fine)	6 Shaft	✓	✓	✓	✓	✓	✓	✓
	12 Shaft	✓	✓	✓	✓	✓	✓	✓



**Final Words.....**  
Thank you very much for your attention!

