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Innovative Binder Technology to Improve Quality and Cost Efficiency

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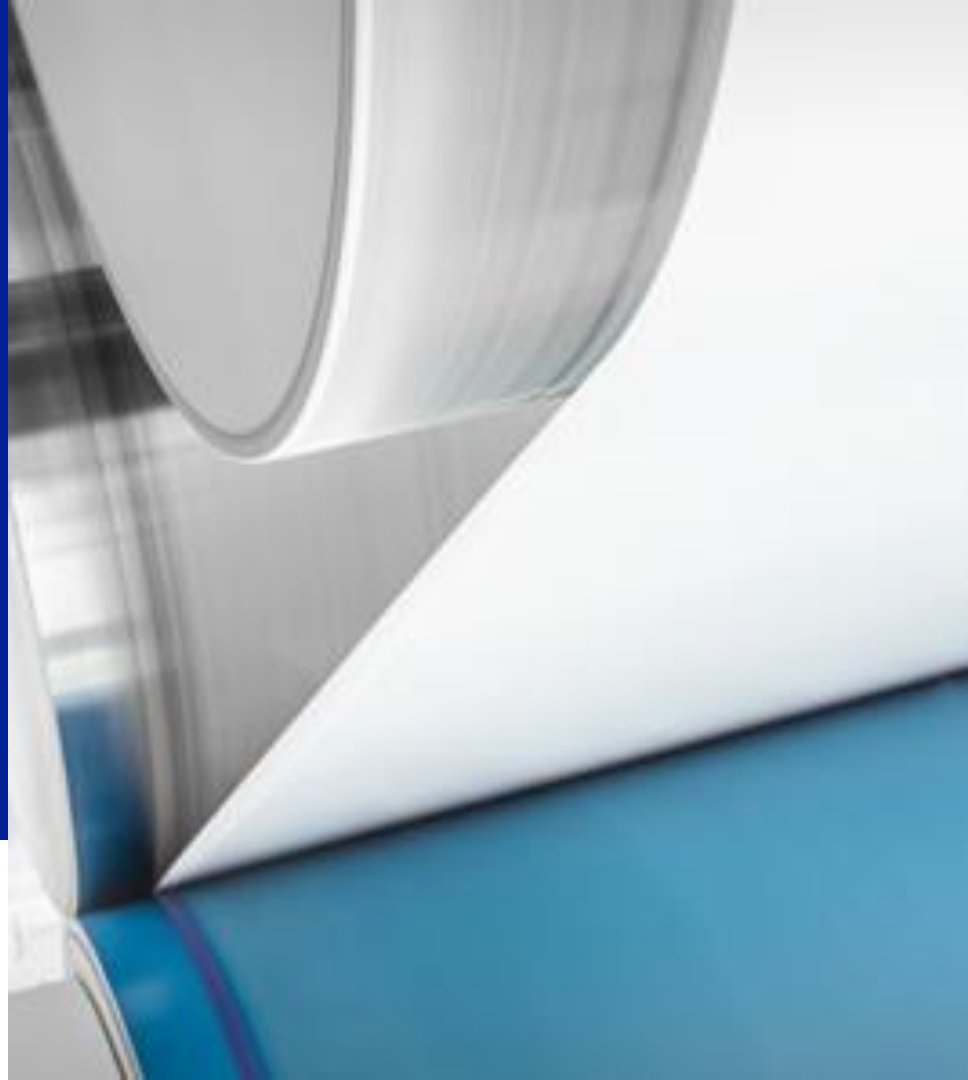
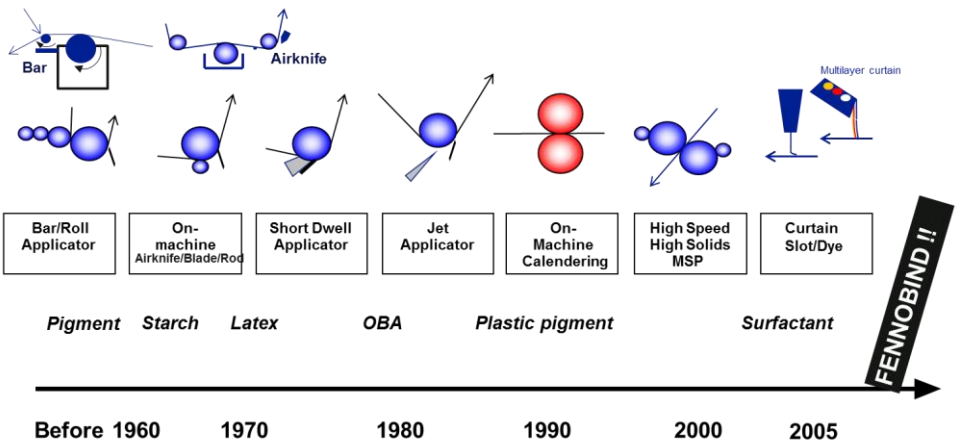
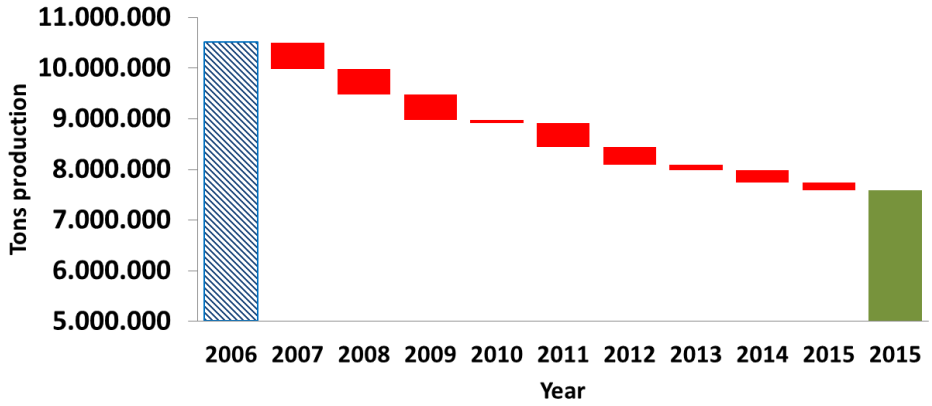






Example Coated Woodfree shutdowns in Europe
Source: Fisher International

WHY Fennobind?

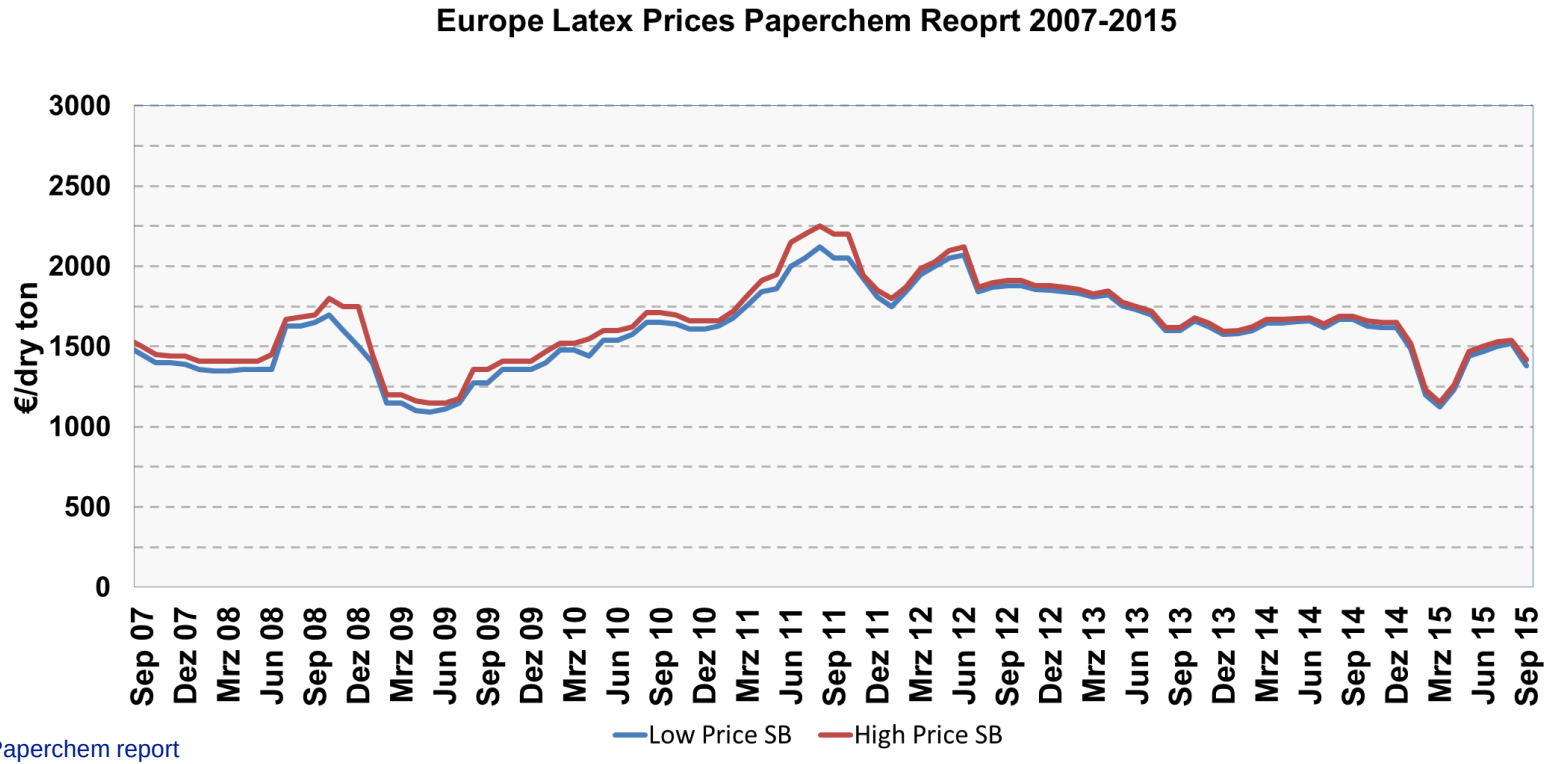
We want to stay in the board and paper business

Develop a binder that is different to the competition and adds real value

And has to work in all coated board and paper segments

Let‘s have a look at some prices

SB-latex low and high price indications

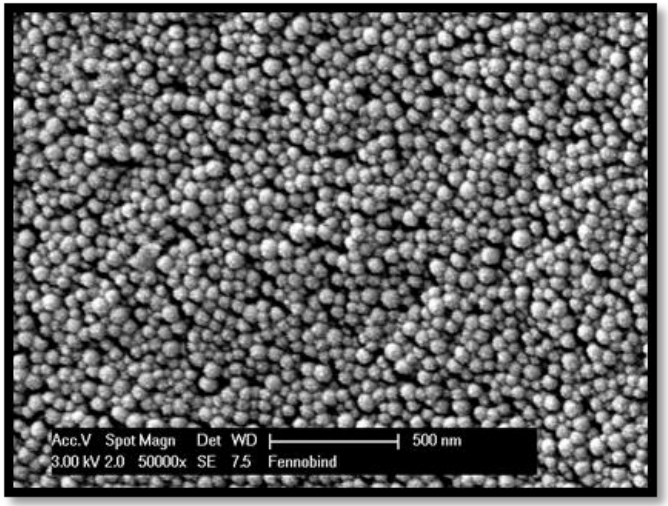


Source: Paperchem report

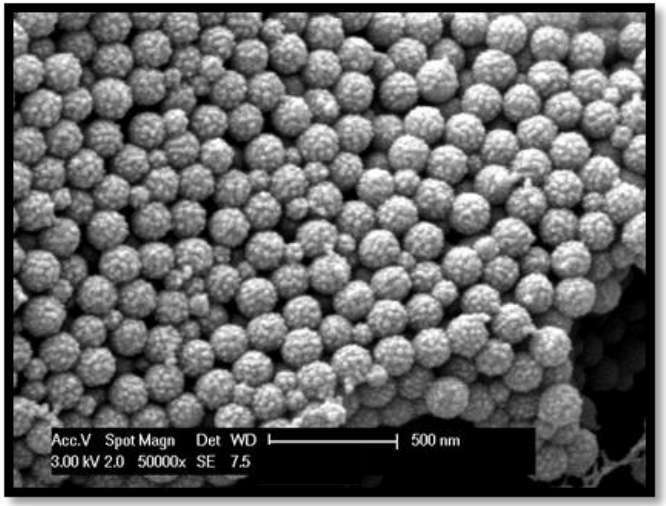
Presentation outline

- How does it work? The philosophy
- Productivity
- Quality
- Converting
- Conclusions

Fennobind Philosophy



Fennobind



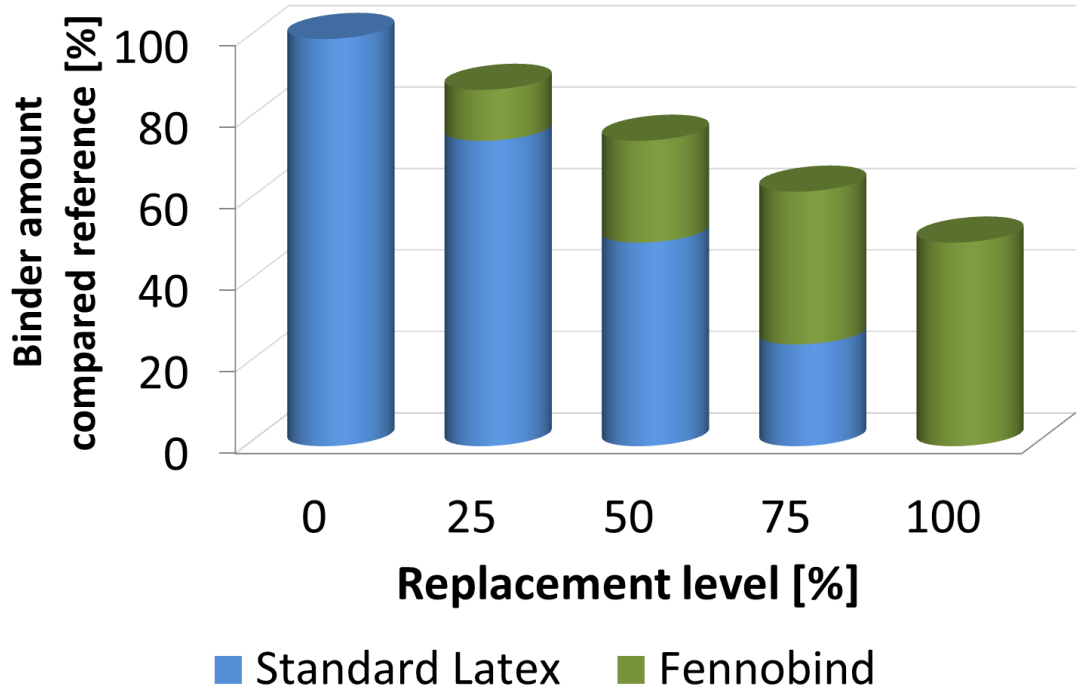
Standard latex

Over 8 times more Fennobind particles in equal volume compared to reference

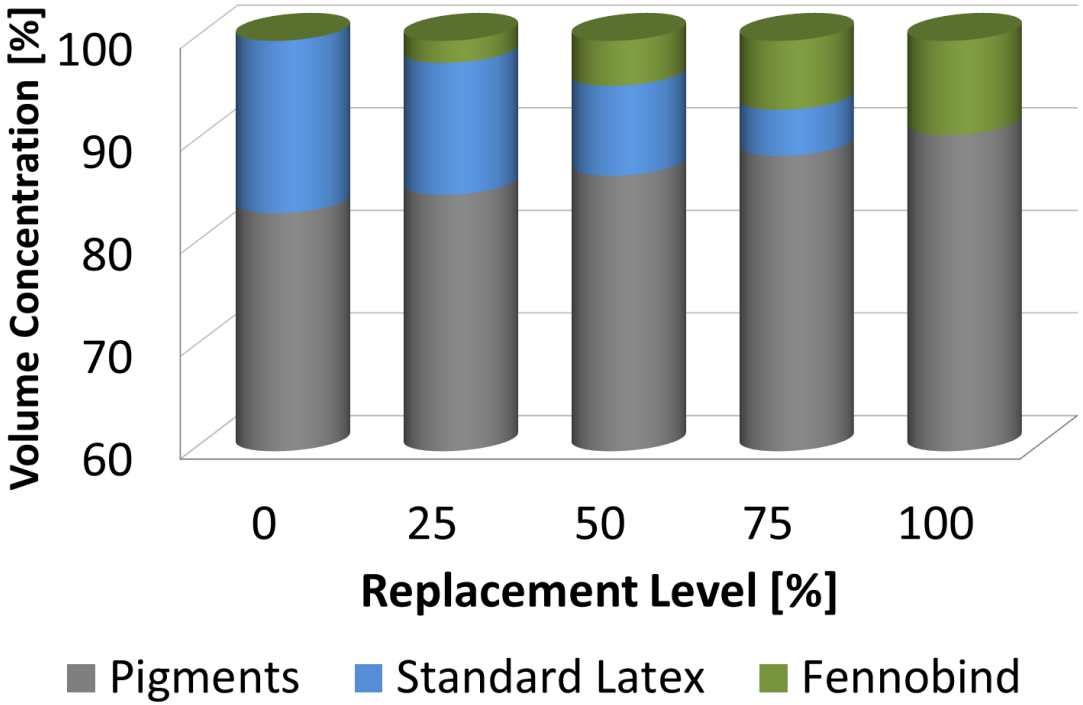
WE OFFER	YOU GET	FENNOBIND
Binding power	Similar surface strength with lower amount of binder	Small particle size with high SSA

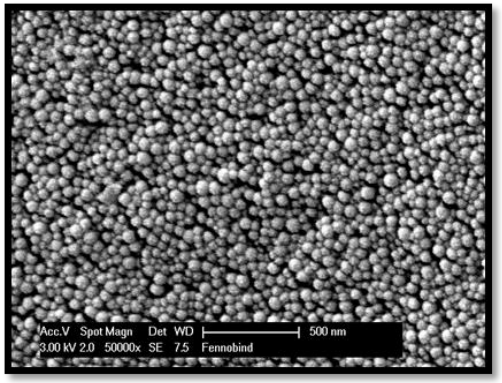
Novel bimodal binder system

How to optimize total binder amount with Fennobind

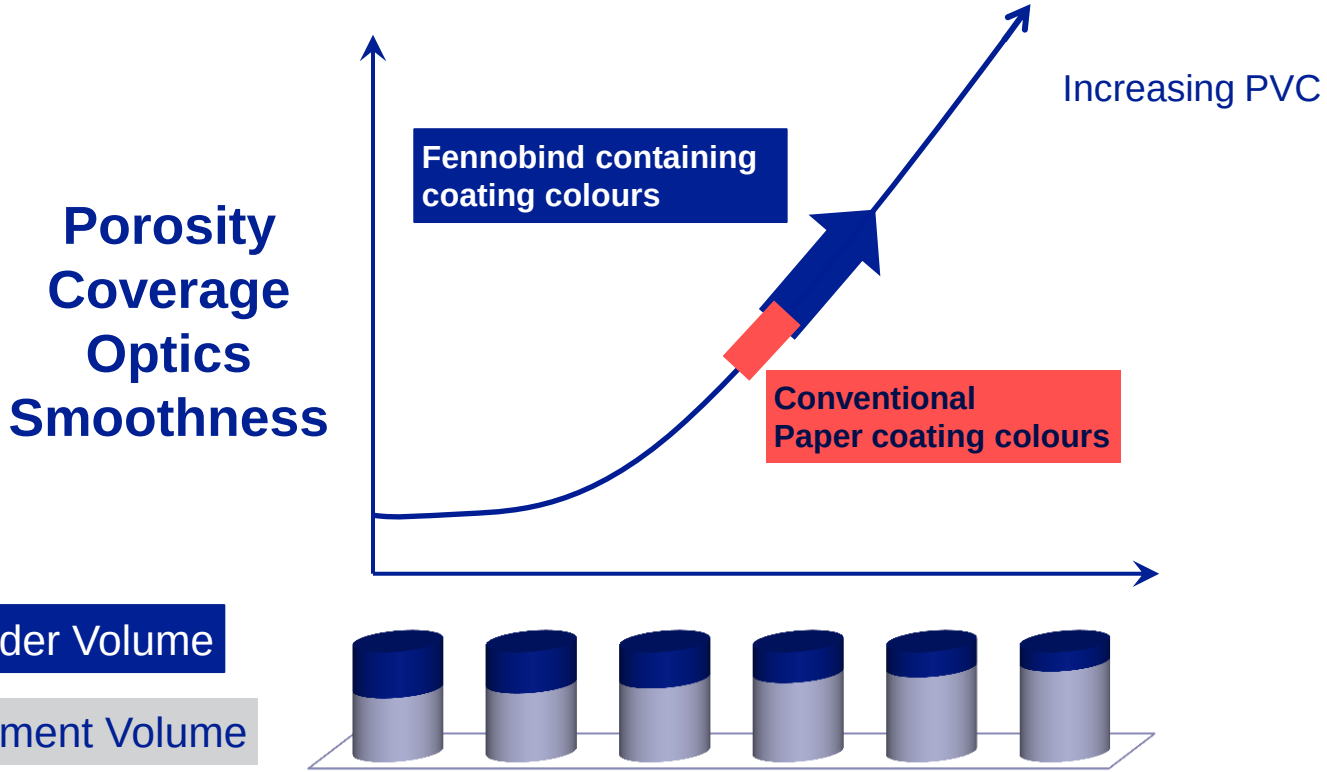


Effect of optimized binder level on pigment (PVC) and binder (BVC) volume concentrations





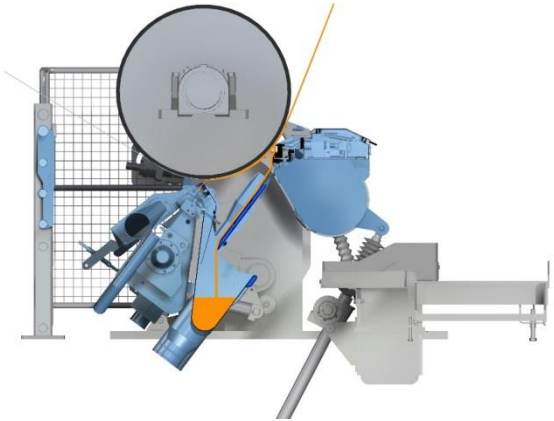
Effect of increased pigment volume concentration on quality



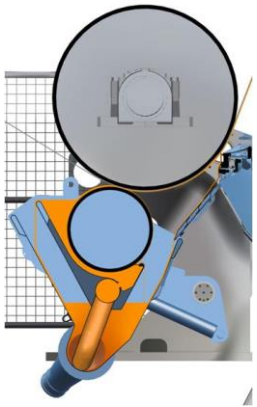
Productivity

Runnability no rheological issues

We have proven that Fennobind works with all coating applications



Jet application

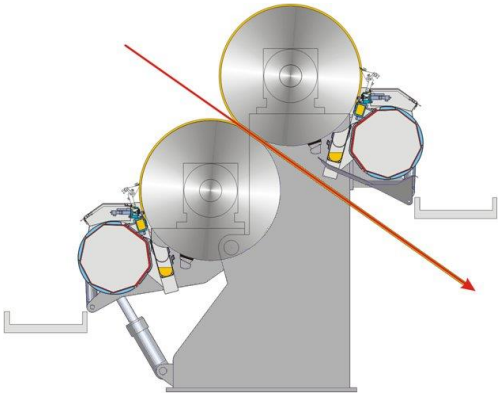


Roll application

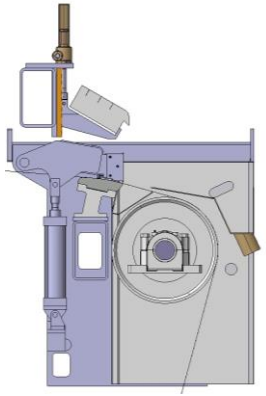
Bent blade

Stiff blade

Rod



Film application

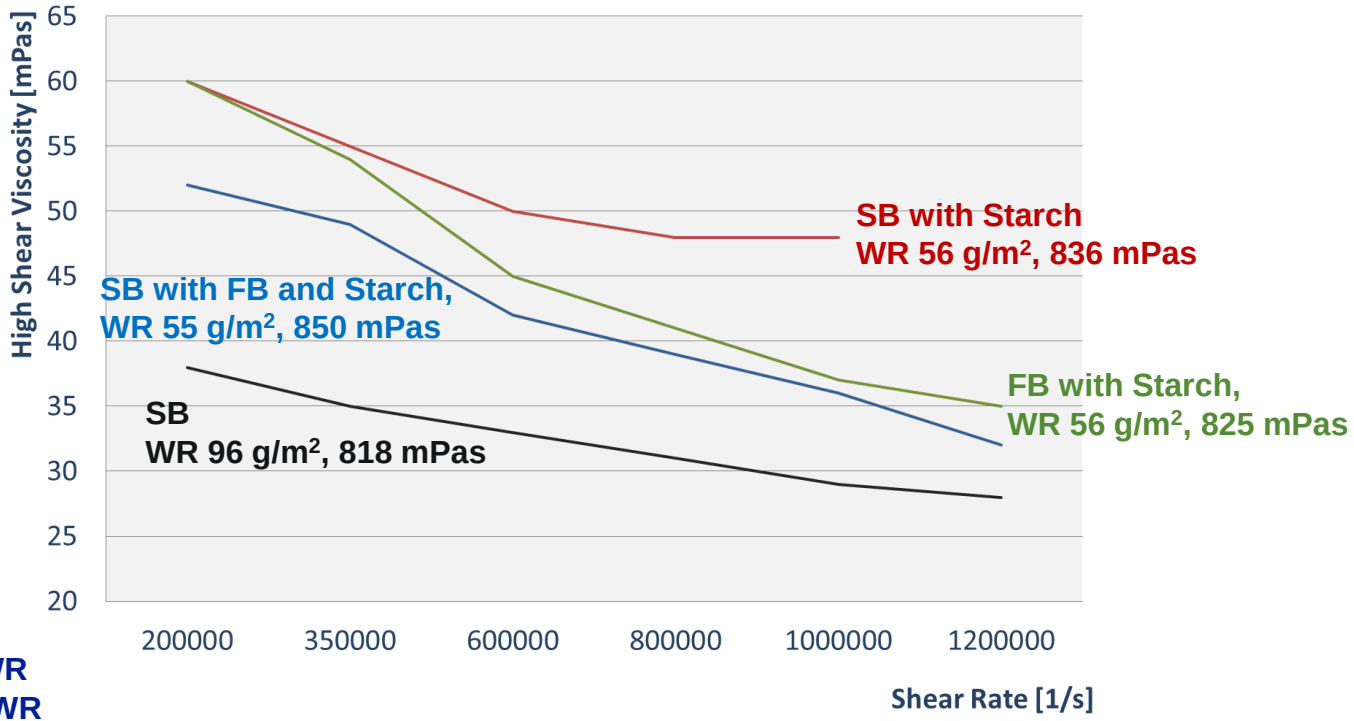


Curtain application

Also Airknife

Source pictures Valmet

Rheology
Advantage together with starch



Note: Water retention =WR
Higher number = worse WR

Quality

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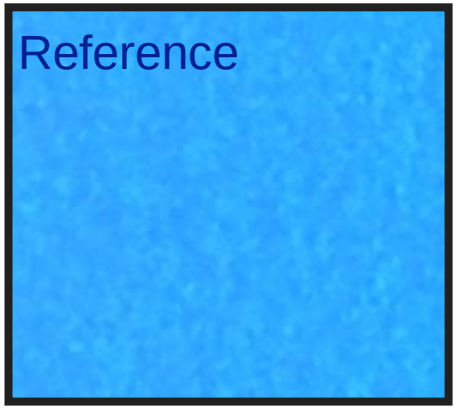
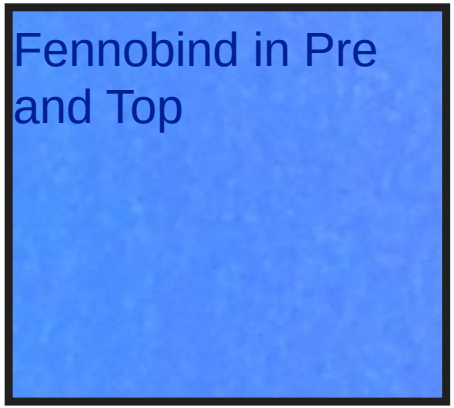
Improved coating coverage coated recycled based board

Burnout test

Under UV light

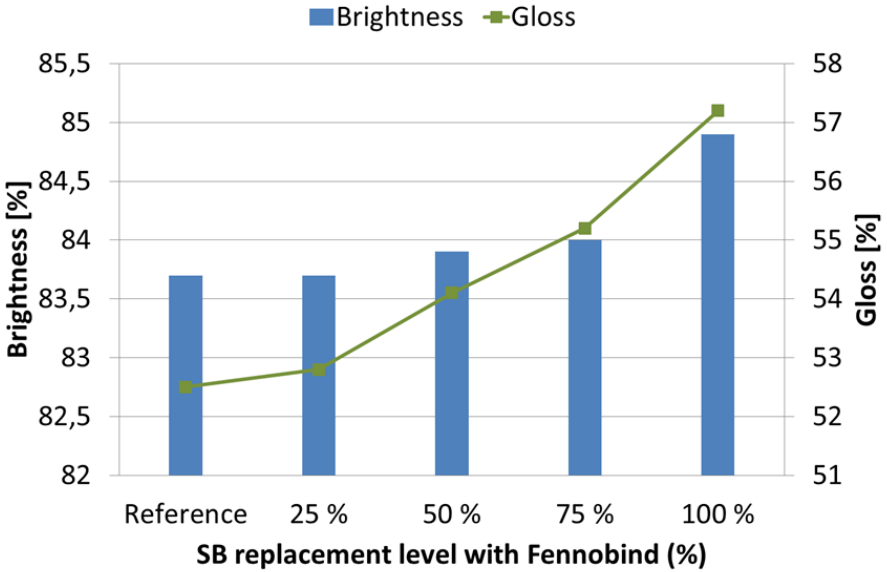
Note: under the UV light the OBA from the base shows through more giving a more mottled appearance



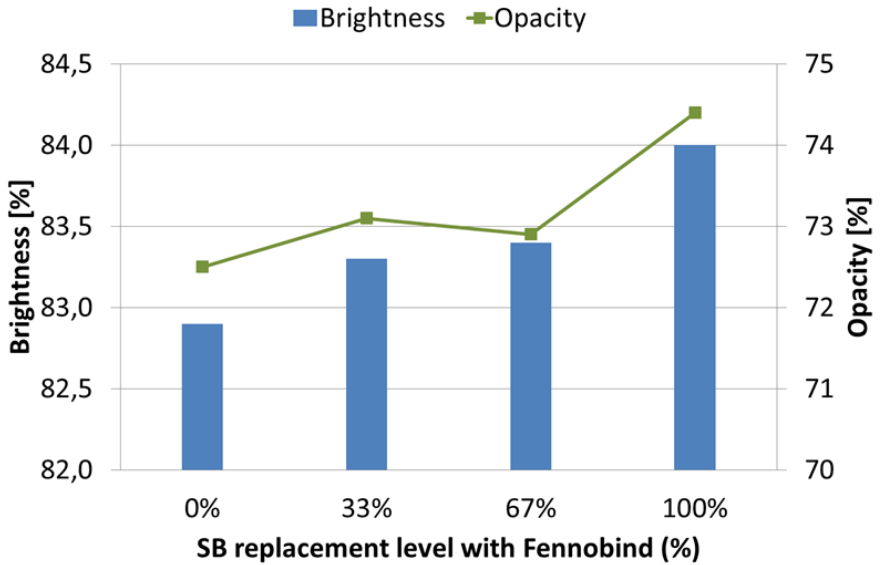


The effect on different Fennobind replacement levels on quality

Solid Bleached Sulphate board



Coated Mechanical paper



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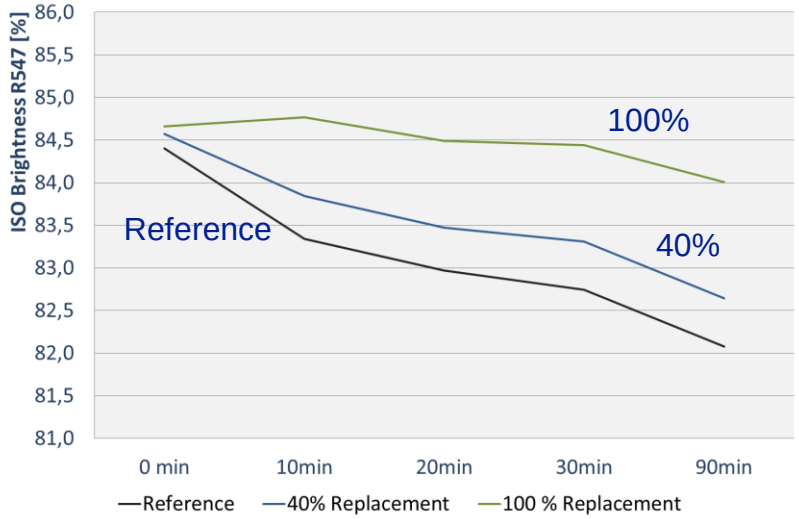
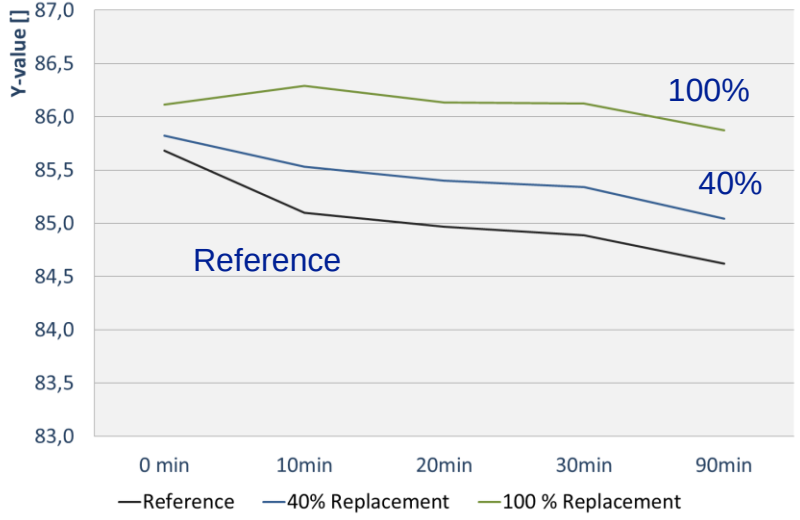
Light fastness

Replacing latex with Fennobind results in less Yellowing, better brightness and Y-value after ageing





	Reference	40 % Replacement	100 % Replacement
Δ Yellowness	3,65	3,34	1,90

Converting

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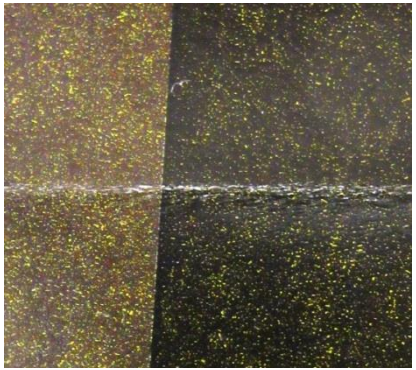
Converting

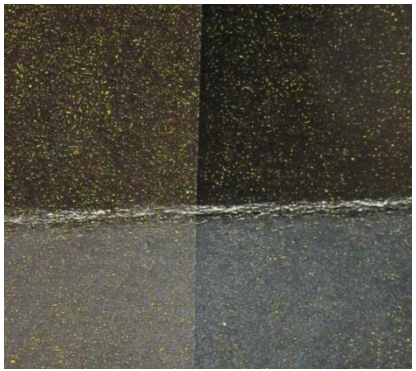
Printing
Ink-setting / Trapping

CMYK CMY

CMYK CMY

Folding





Creasing and Gluing

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Printing Sheet fed Offset print and Flexo print

Precoat	Reference	Fennobind	Reference
Topcoat	**Reference**	**Reference**	**Fennobind**
Mottling	Normal	Better	Better
Print Gloss K100	88	89	87
Set-off 0,06 s	19	19	19
Set-off 10 s	62	63	68
IGT surface strength (m/s)	0,8	0,8	0,9

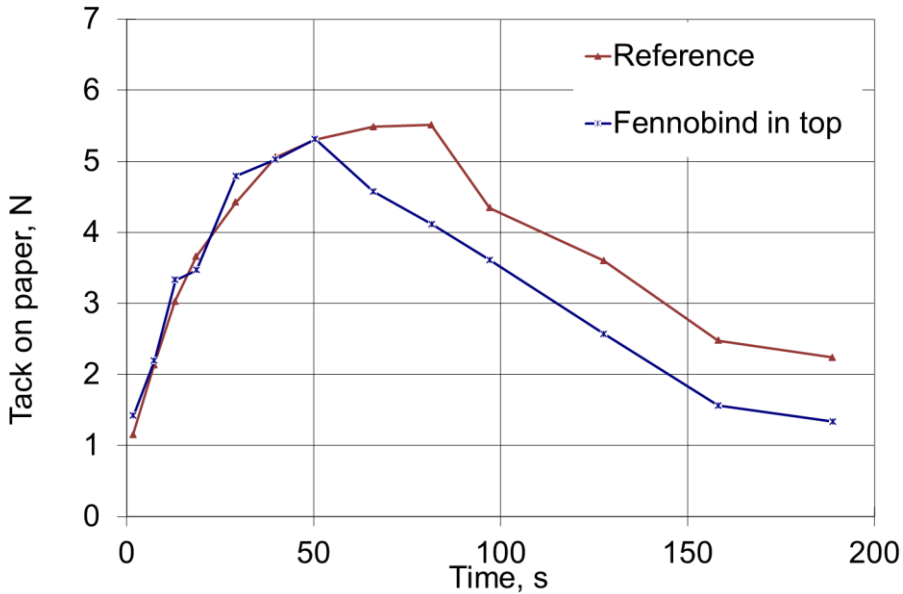
	Reference	Decreasing Total Binder Level →		
Print Gloss (%)	60	62	64	66
Density	1,78	1,84	1,89	1,88
Dot Gain (%)	18,8	18,6	17,5	17,2

Fennobind in printing

Optimized Porosity and Coating Coverage

- Pore volume and pore size distribution are the key for offset ink setting in coating layer
- Pigments are the main driver for the pore structure (as ~90% of coating layer is pigments)
- More uniform binder distribution and better coating coverage helps to reduce mottling

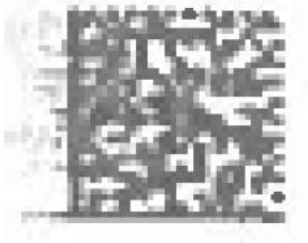
> More uniform printout



Ink-Jet Pharma Coding

EU directive 2011/62

Standard Binder
coding failed



With Fennobind concept
very good coding

- Pharmaceutical boxes made of board are frequently coded by ink-jet with 2 dimensional data matrix codes e.g. QR code (Quick Response code), text or barcode (codes ISO/IEC 15415 verified)
  - The code has to be reliable and machine readable
- Fennobind enables the ink-jet coding without special pigments e.g. PCC or additional surface treatment

You Get – Cost Efficiency

Opportunity to improve runnability and increase solids

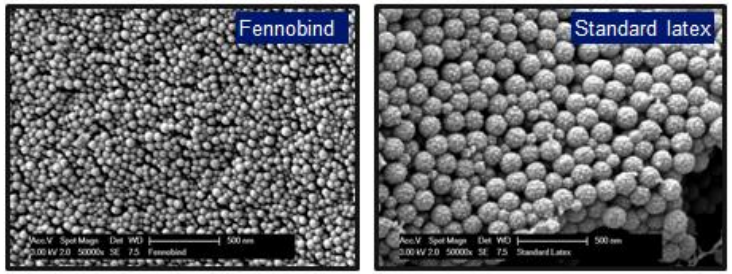
Opportunity to optimize coating layers and pigment compositions

Opportunity to use less binder without compromising printability

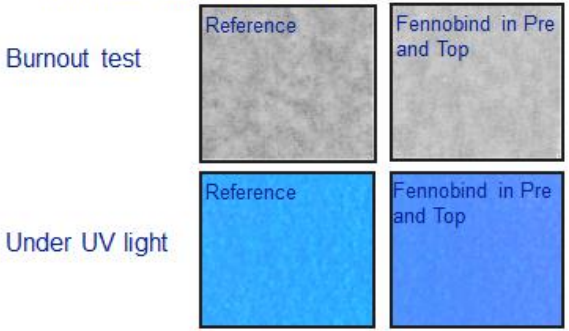
Opportunity to use standard pigments in special applications

You Get – Cost Efficiency

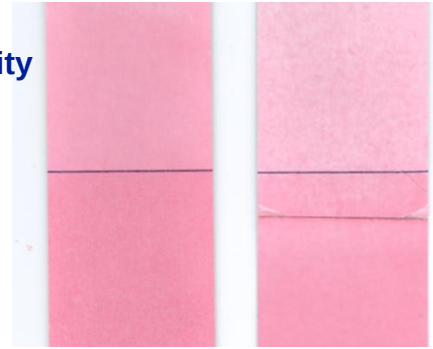
Fennobind Philosophy



Improved coating coverage



Improved printability



Ink-Jet Pharma Coding

Standard Binder *coding failed*	Fennobind concept *very good coding*

Conclusions

This new technology offers opportunity to optimize coating colour components, runnability and production efficiency

WE OFFER	YOU GET	FENNOBIND
Binding power	Similar surface strength with lower amount of binder	Small particle size with high SSA
Improved rheology	Coater runnability	Bimodal binder system
Better coverage	Improved gloss, optics and print eveness	Even binder distribution and controlled migration
	Higher porosity	Lower total binder volume
Faster ink setting	Similar or improved print quality less smearing	
Sustainable chemistry	Carbon Foot Print 2100 kg/CO_2 eq. / ton	

Where water meets chemistry™

Acknowledgements

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Kemira