



Building Leadership Excellence



Detailed analysis of the dewatering process on a CrescentFormer tissue machine

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Detailed analysis of the dewatering process

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Trial data collection

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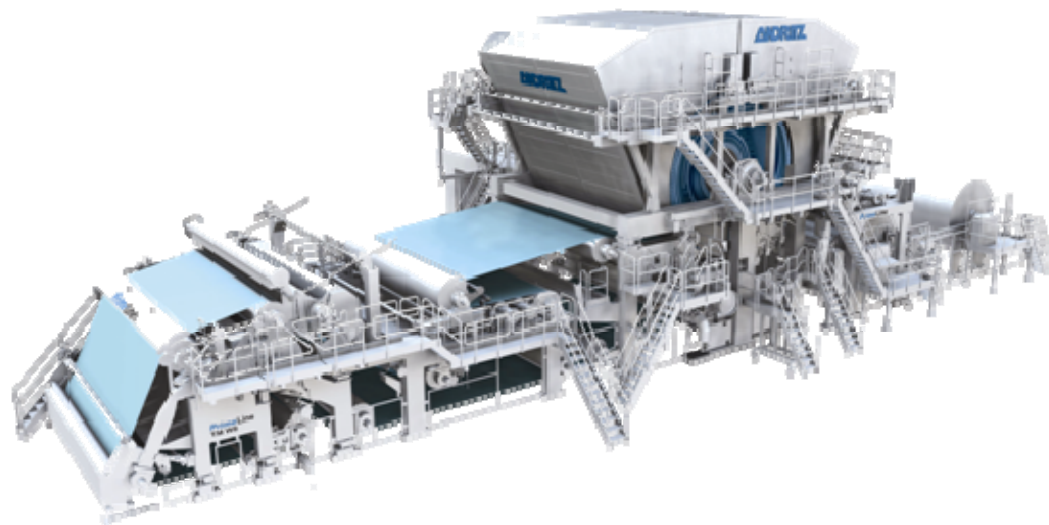
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Conclusions



Detailed analysis of the dewatering process

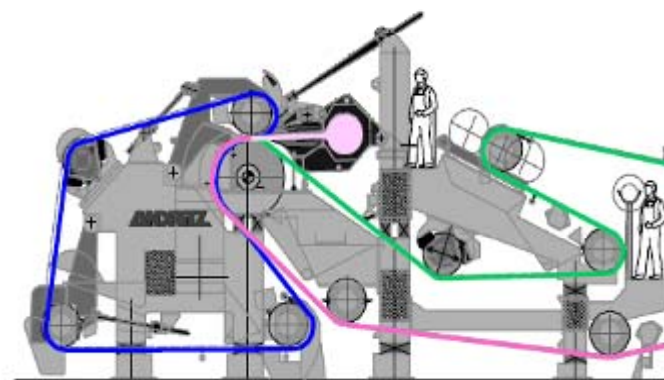
Background

Starting point

- Crescent former
- Single side dewatering

Papermaker issues

- Water handling
 - Optimized white water tray design
 - Speed up capability
- Dewatering performance of different fabrics
 - Fabric characteristics \neq dewatering capacity



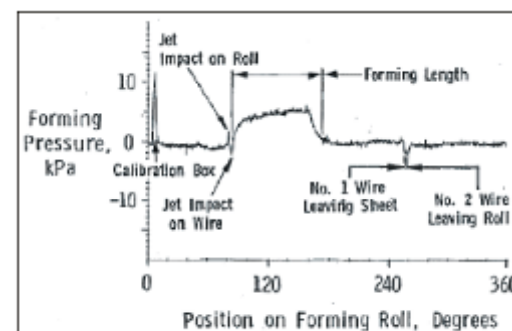
— wire
— felt
— paper

Detailed analysis of the dewatering process

Background

Approach

- Literature study
- Selection measurement equipment
- Trial methodology
- Modeling as part of master thesis



Detailed analysis of the dewatering process

Trial data collection

What to measure

Dewatering pressure through process

Forming length

Variables

wire tension, basis weight, consistency

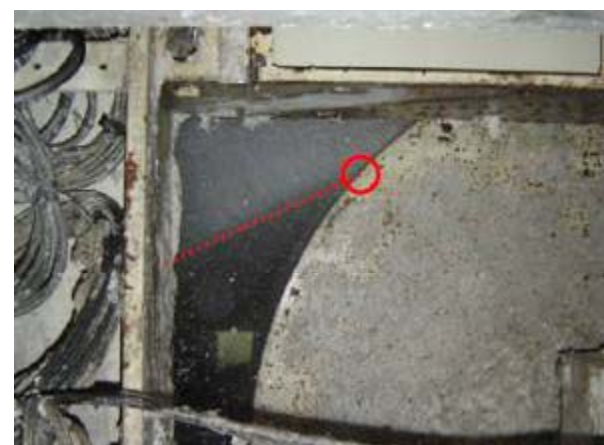
speed, furnish, forming fabric design

How to measure

RadiAnalyzerX (ultra thin pressure sensing)

Physical measurement

Strobe & camera



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Line measurement



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Pressure measurement



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Trial data collection

How to measure

RadiAnalyzerX

Physical measurement

Strobe & camera

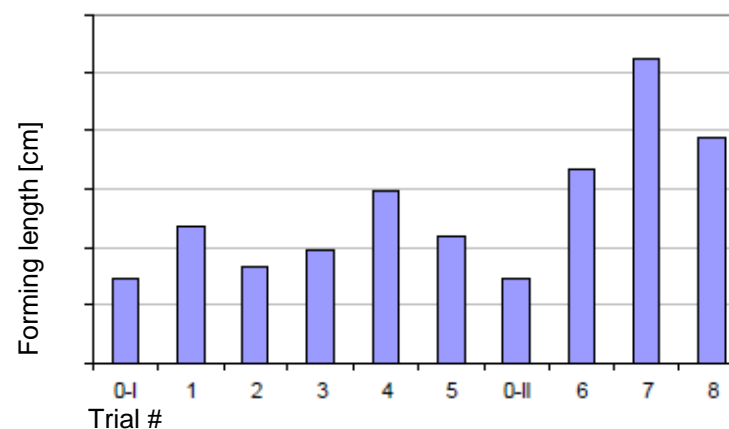
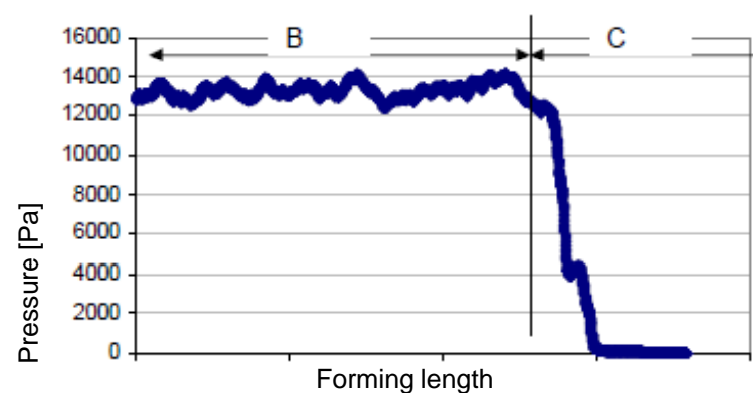
A



B



C



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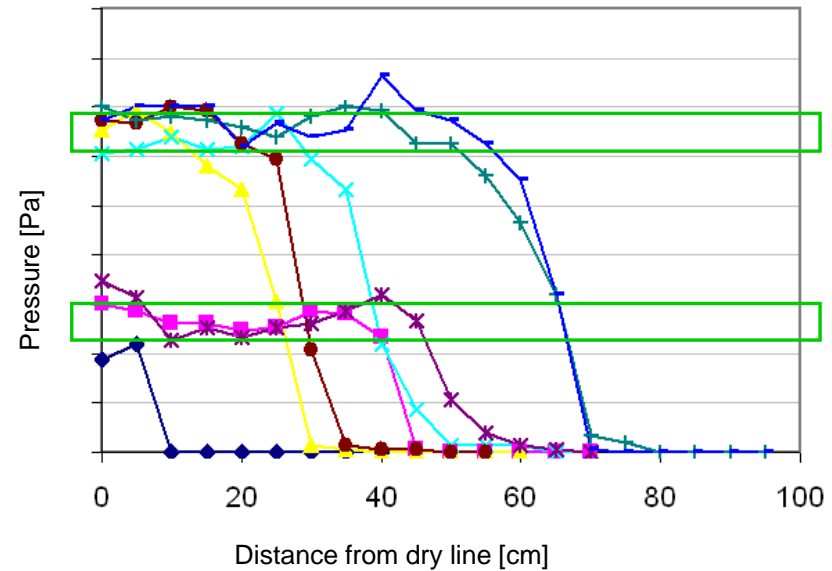
Detailed analysis of the dewatering process

Experimental findings

Dewatering pressure

2 wire tension levels

Good correlation with
theoretical model
($p=T/r$)

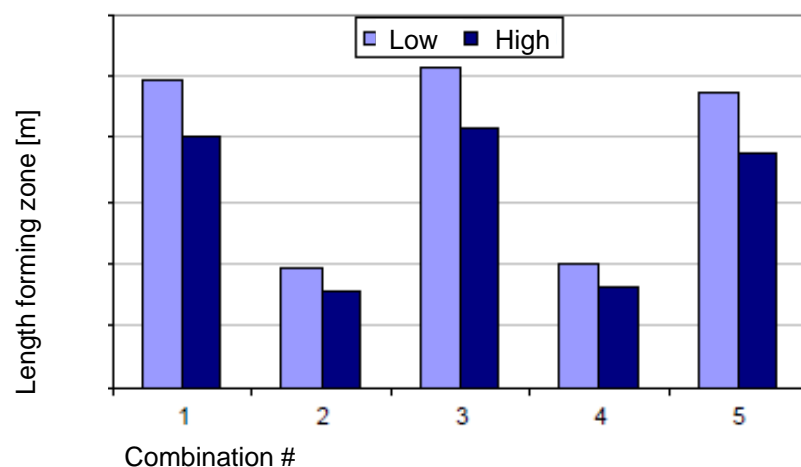


Detailed analysis of the dewatering process

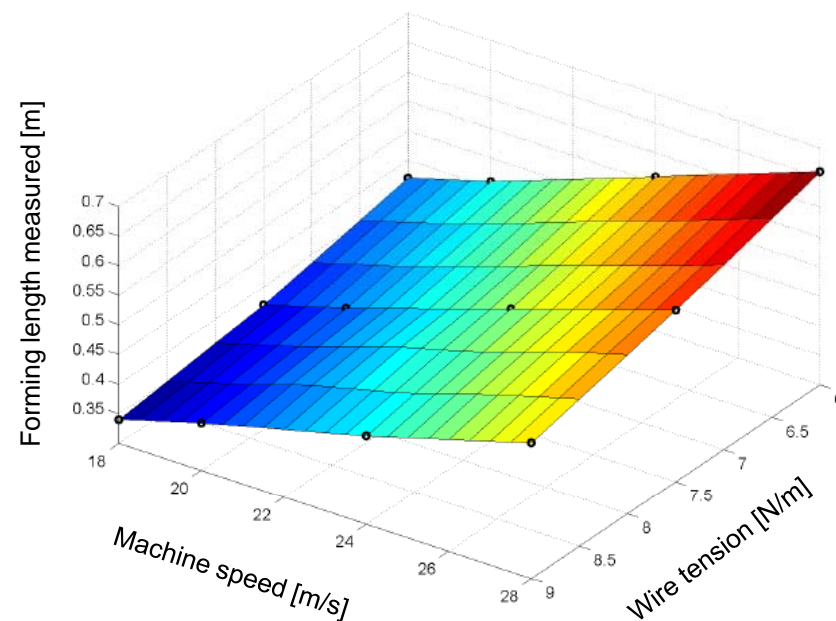
Experimental findings

Forming length

Wire tension



Forming length vs. machine speed and wire tension



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Experimental findings

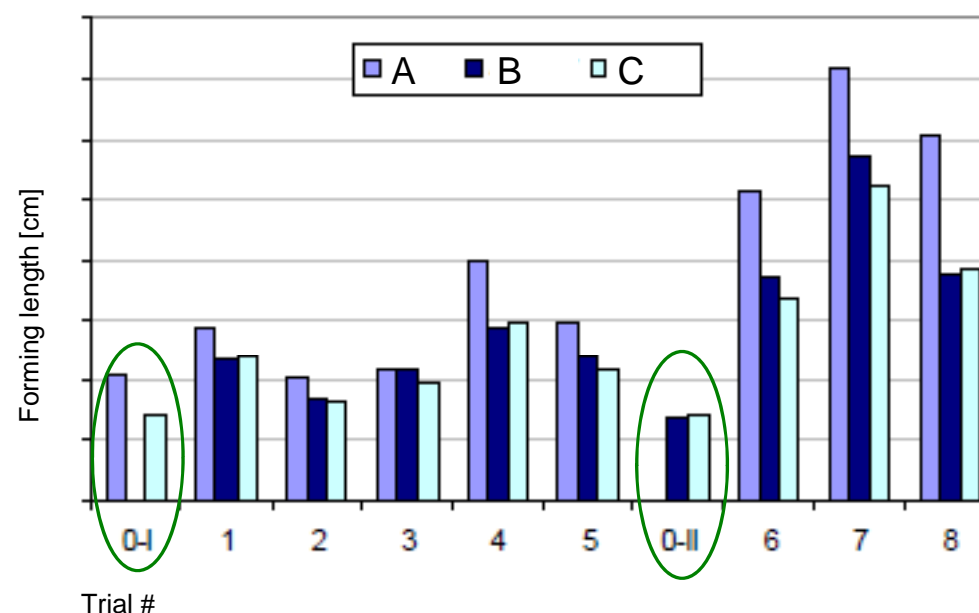
Forming length

Fabric comparison

A...triple layer, 500 cfm

B...triple layer, 530 cfm

C...triple layer, 440 cfm



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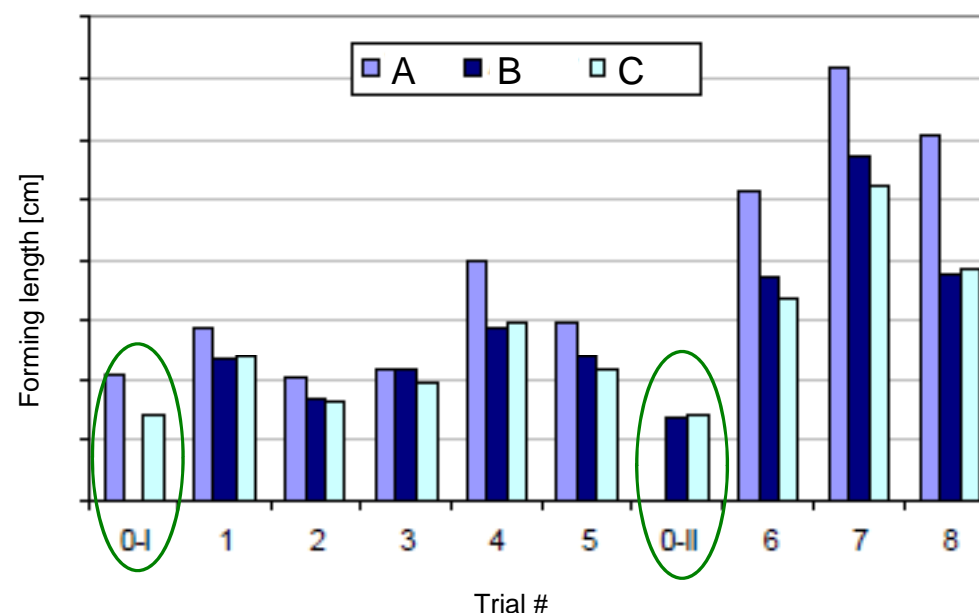
Experimental findings

Forming length

Furnish, wire tension

Speed, basis weight

Trial #	Wire tension	V jet [m/min]	v wire [m/min]	BW Y. [g/m ²]
0-1	Low	Low	Low	Water
1	Low	Low	Low	Low
2	High	Low	Low	Low
3	High	Middle	Middle	Low
4	Low	Middle	Middle	Low
5	High	High	High	Low
0-11	High	High	High	Water
6	High	Low	Low	High
7	Low	Low	Low	High
8	High	Middle	Middle	High



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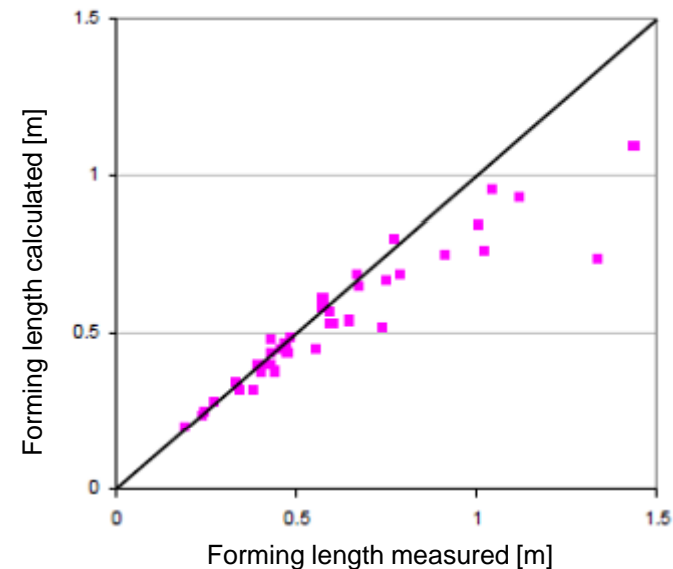
Detailed analysis of the dewatering process

Modeling

Creation of a dewatering calculation tool based on fundamental physics

Eingangsgröße	Wert	Einheit	Variablen im Modell	Ausgabe
Zeitschritte	0.0001	s	dt	Abschnitt2
Schritte	0.01	m	dt	Massenabweichung
Headbackkonsistenz	0.0018	kg/kg	cf	Abweichung
Maschinengeschwindigkeit	25.00	m/s	UM	Endflächengewicht
Dichte der Suspension	1000	kg/m³	rho	Abstand D
Massenbeladung von Wasser im Blatt	10	kg/kg	eps	
Formierwalzenradius	0.75	m	R	
Sekspannung	9000	N/m	T	
Seibmasse	1	kg/m²	m	Umfang Formierwalze
Leiterschneidung	0.0111	m	Uppa	Formierschneidung
initiale Entwässerungsdruck	8000	Pa	gC	Umschlingungswinkel
minimale Retention	0.9		Retmin	% der Vorgabe
maximale Retention	0.95		Retmax	
Mahlgrad	20	SR	MC	
zu erwartendes Flächengewicht	20	g/m²	BW_soll	
Seib	1			
Umschlingungswinkel	130	°		
ASTEK- und ALBANY- Sieb: Wert 1				
VOITH Sieb: Wert 2				
Berechnung				
Run				
PostProc				

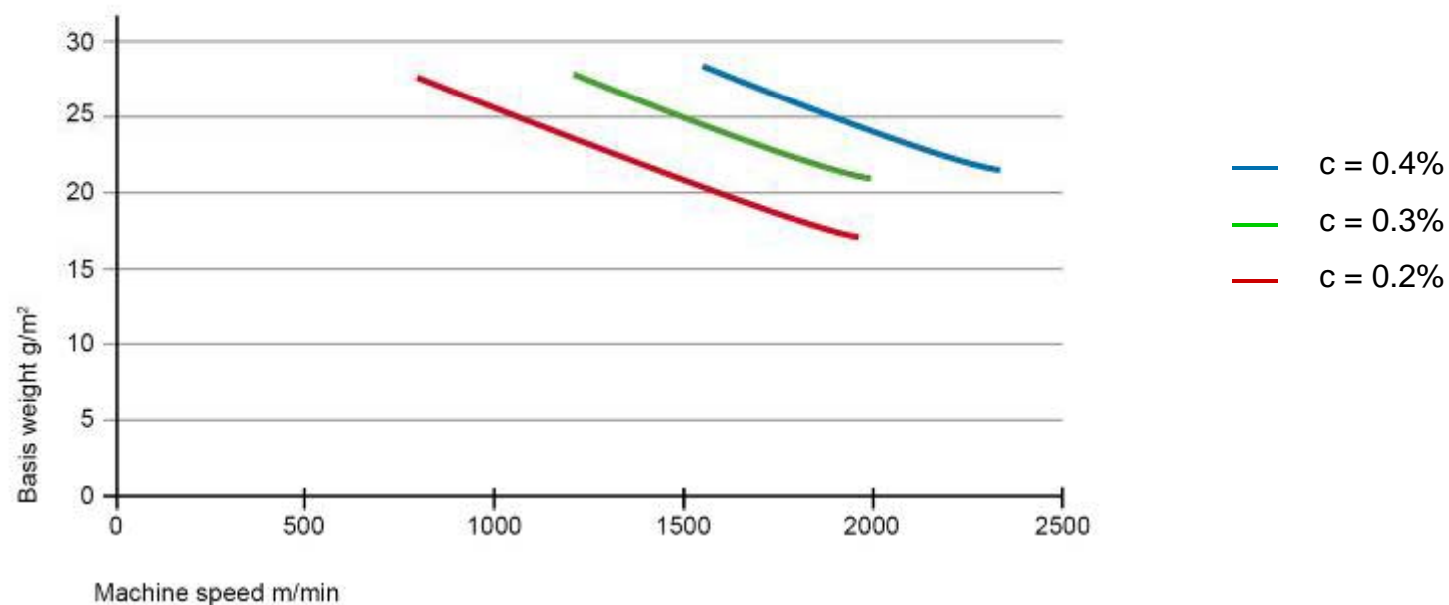
Good correlation of measured and calculated values



Detailed analysis of the dewatering process

Model outputs - limits

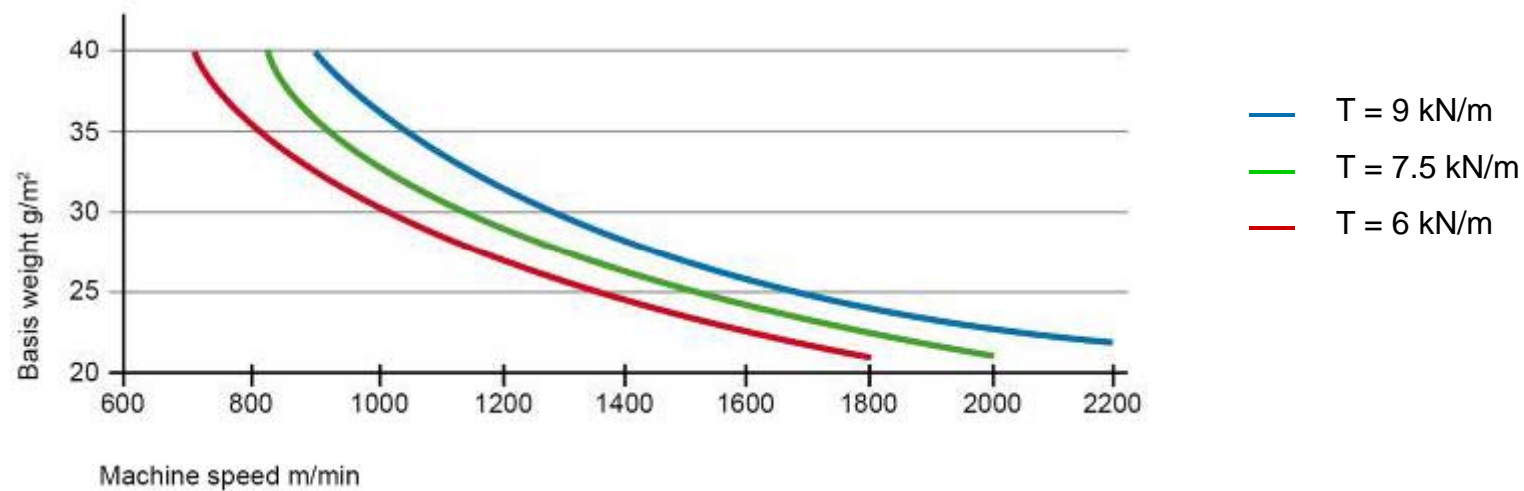
Consistency



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Model outputs - limits

Wire tension



Detailed analysis of the dewatering process

Conclusions

Insight to the crescent dewatering characteristics

Measured dewatering pressure fits conventional theory for roll forming

Increased:

Wire tension

Speed

BW

Freeness

Retention

Consistency for given BW

required forming length:

(↓)

(↑)

(↑)

(↓)

(↓)

(↓)

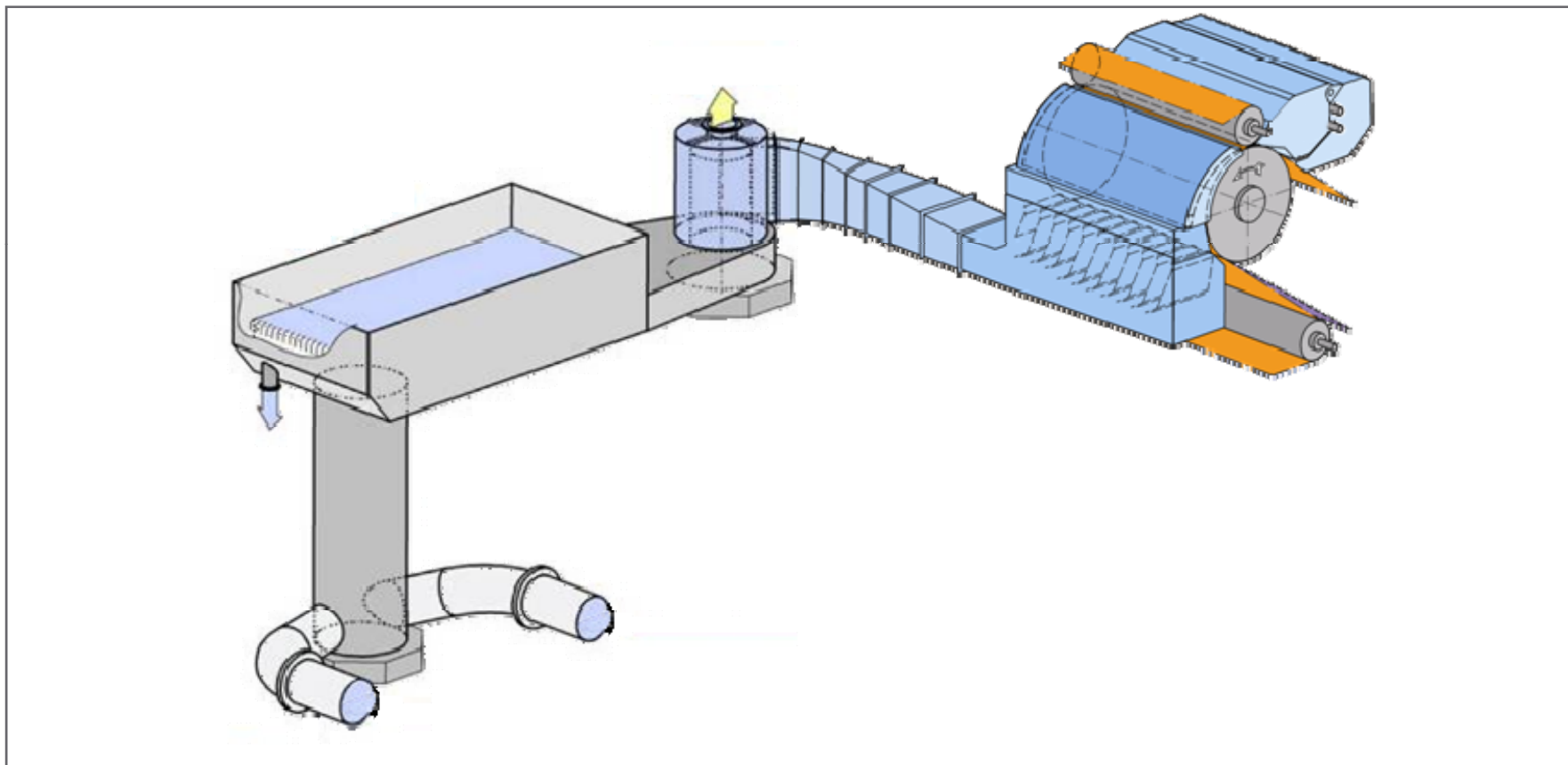


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Saveall Optimization





Thank you for your attention

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