Cem Tec

Climate change appears to be accelerating

a big challenge for all Industries

Daily we get news from droughts, fires, hurricanes and floods from any country in the world.




Can the fiber cement Industry contribute to reduce carbon output and stabilize the global warming ?

Yes, they can.

My be with SOFT DEWATERING

And by the way, reduce their production cost

SOFT DEWATERING

Substitute oversized pumps result in saving of 100-400 Kw, 4-12’000 t CO2 and cost up to 300 t $/machine year

WITH SOFT DEWATERING, SOME PROCESS VARIATIONS HAVE REDUCED.

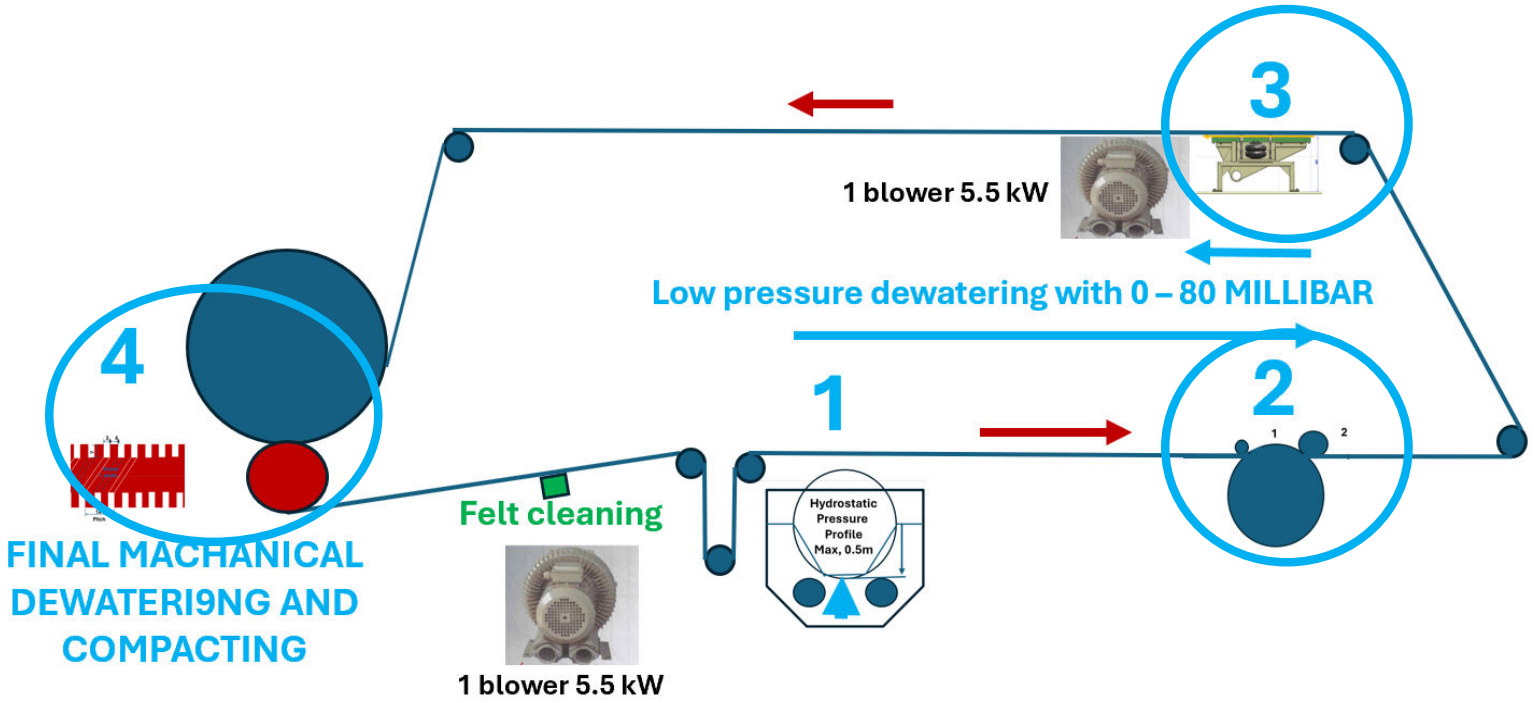
YIELD INCREASE BY REDUCTION OF VARIATIONES

< OPTIMIZE FIBER USE, REFINING, DISTRIBUTE AND PROCESS IT
< OPTIMIZE STUFF WATER CIRCUIT, MINIMIZE AND STABILIZE IT

THE POTENTIAL IN RAW MATERIAL SAVING IS NOT YET USED

SOFT DEWATERING, ADUSTED ZONES 4VAT MACHINE

REDUCTION DEWATERING TO 4 AIR-LESS LOW-PRESSURE DEWATERING ZONES



1 SIEVE
HYDROSTATIC PRESSURE

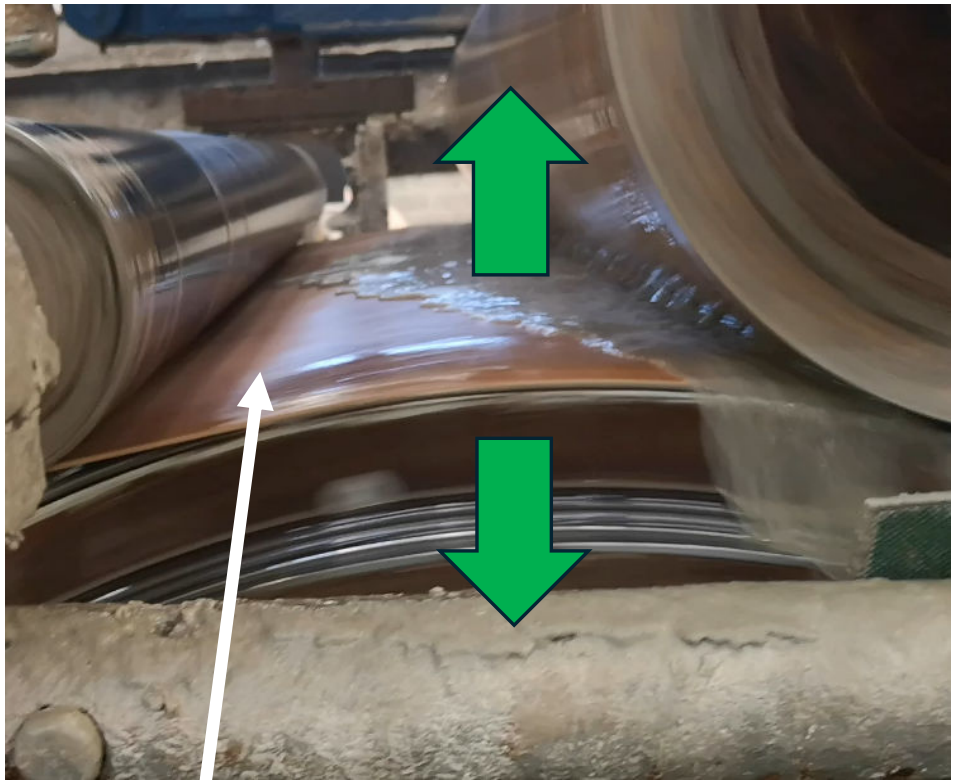
2 BETWEEN
SIEVE AND FELT

3 VACUUM, LOW
PRESSURE

4 MACHNICAL
ROLLER PRESS

1. EXTEND LOW PRESSURE DEWATERING ZONE TO 10 METER
2. REDUCING VACUM DEWATERING BOXES TO 1 ONLY
3. TRANSFER SOME PART OF DEWATERING TO ROLLER PRESS

Double dewatering route between felt and sieve



Dewatering length:

40 cm contact angle =

2x 40 cm, up- and downwarts

= 80 cm dewatering Length

X4 VAT = 3.2 M PLUS

As soon as felt touch sieve dewatering, upwards starts
Dewatering downwards depend on sieve openness and cleanness

What is the demand in air volume to operate a high-performance sheet machine on the optimum pressure?

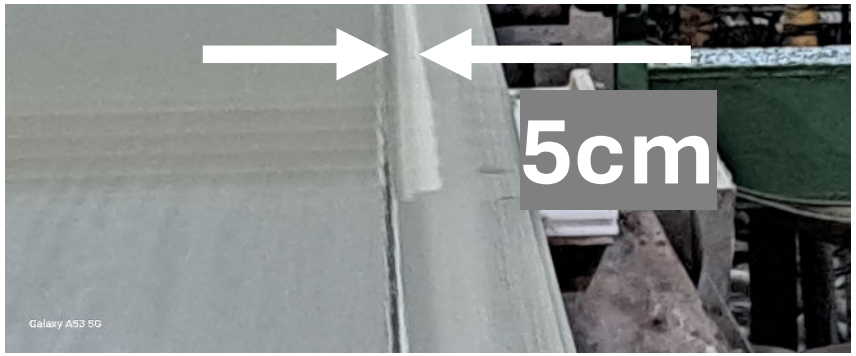
.

500, 1000 or 2000 m3/hour?

LESS THAN 200 M3/HOUR

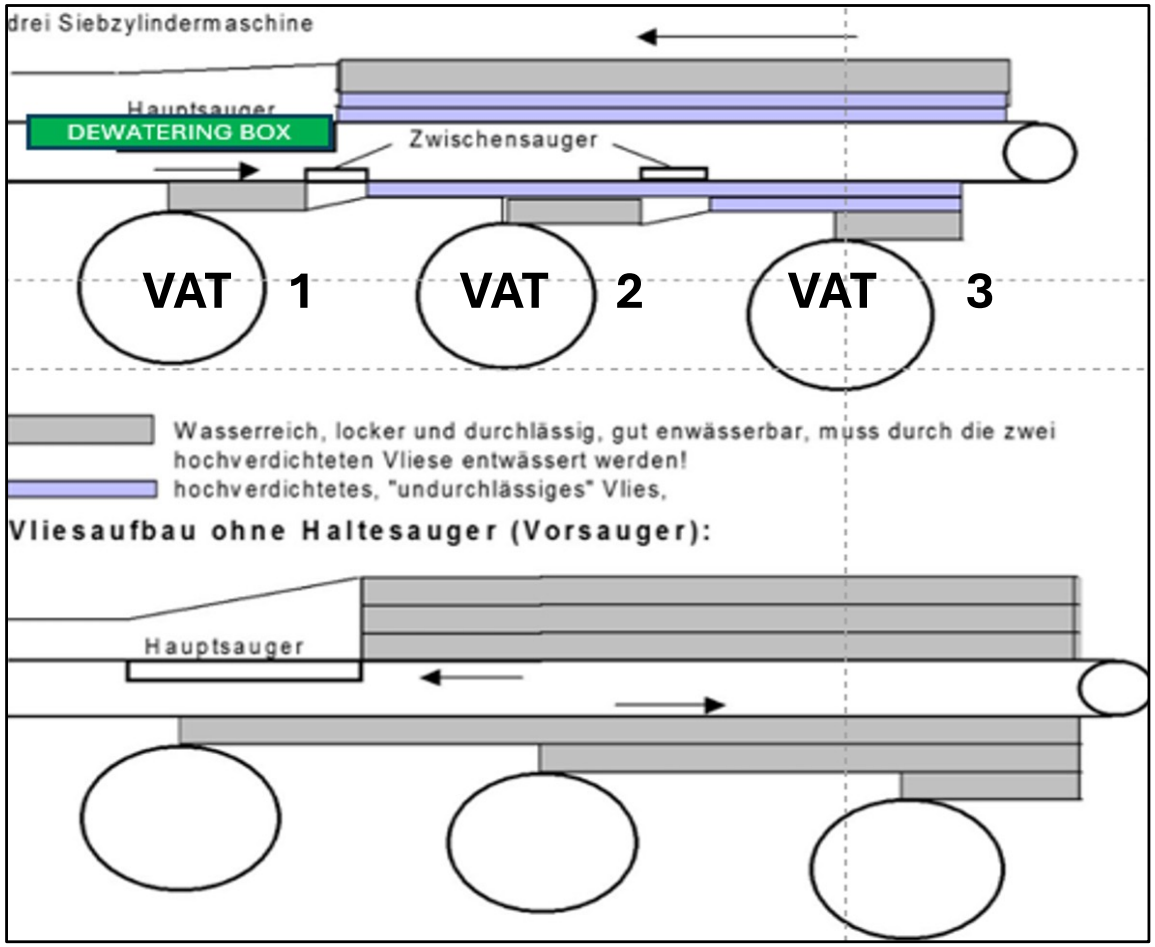
THESE WE CAN PROVIDE WITH A 5.5 kW BLOWER

WE ADJUST THE PROCESS SO, THAT IT CAN WORK WITH VACUUM PRESSURE OVER THE FULL LIFETIME IN THE OPTIMUM GREEN RANGE



1 Box gap width << < than film width
Result in 1200 m3/ hour air loss

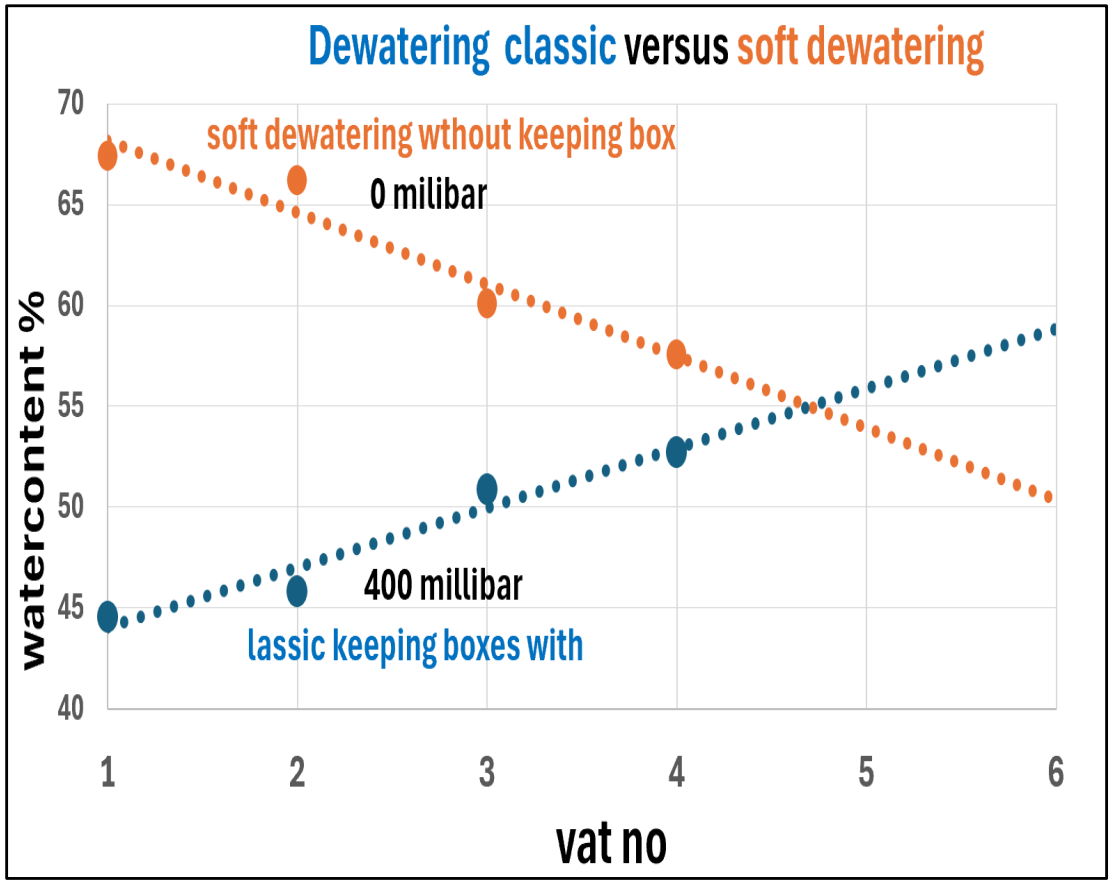
KEEPING BOXES ARE COMPACTING FILM



CLASSIC WITTH KEEPING BOX
THE LAST LAYER MUST BE DEWATERED TROUGH ALL DEWATERED LAYERS BEFORE.

WITHOUT KEEPING BOX
ALL LAYERS ARE AIRLESS NOT VACUUM COMPACTED, WHEN THEY COME TO DEWATERING BOXES

Keeping boxes are blocking film and



WITHOUT KEEPING BOX

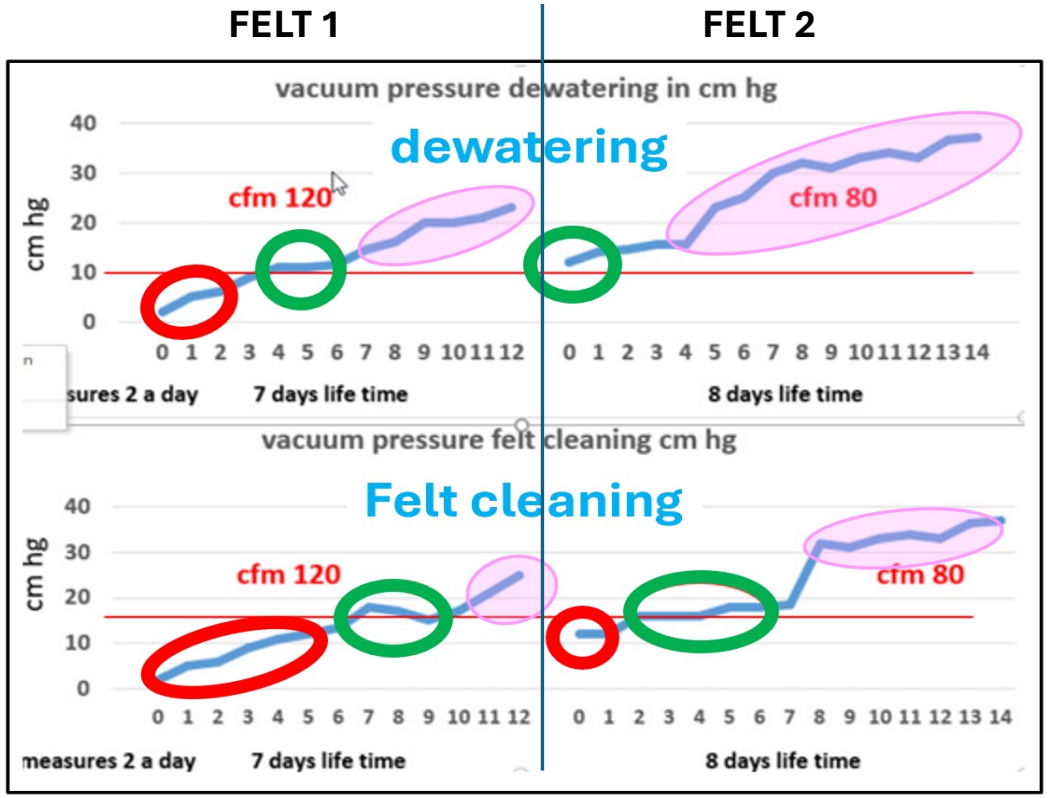
WATERCONTENT IS FALLING FROM 1. TO 4. vAT

CLASSIC WITTH KEEPING BOX

WATERCONTENT IS INCREASING FROM VAT 1. VAT TO 4. VAT. EACH BOX BLOCK MORE THE FELT AND HANDICAPS DEWATERING

DEVELOPMENT OF VACUUM PRESSURE IN CLASSIC PROCESSING

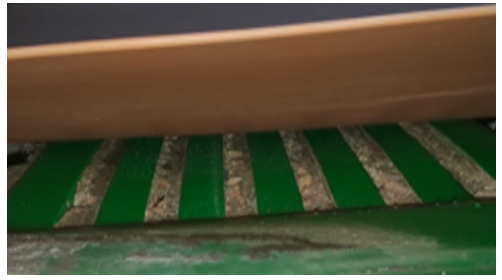
WITH KEEPING BOXES 2 FELTS LIFES IN 3 PHASES



Phase 1: 6hours – 1 day, big air losses, too low pressure

Phase 2: 1-2 days optimum pressure, good products and output

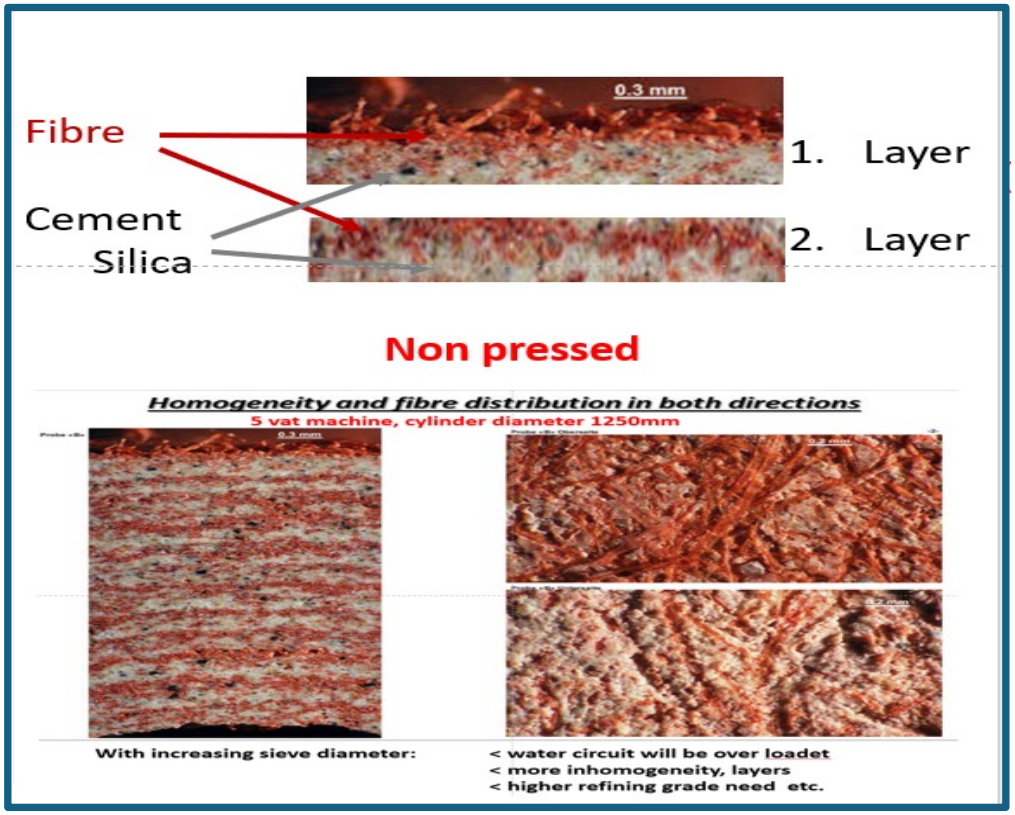
Phase 3: box gaps and felt are starting to block, quality and output are



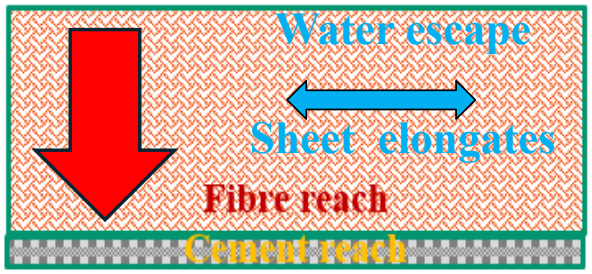
Blocked gaps result in poor quality and low output

TO GET A STABLE PROCES WE NEED A CONSTANT AND LOW VACUUM PRESSURE OVER A FELT LIFE

High vacuum pressure favor
Delamination and early fell down from former drum



Water way Down is Blocked



Water and fibre reach

Water poor Cement rich barrier

Consequents

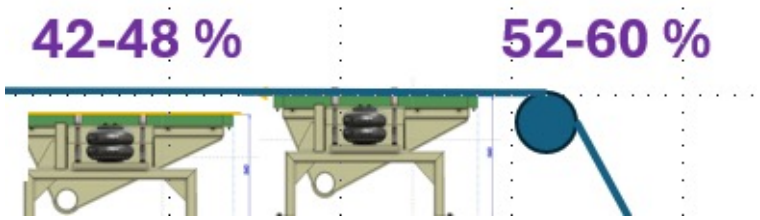
20 mm sheet production

ends by 8-12 turns.

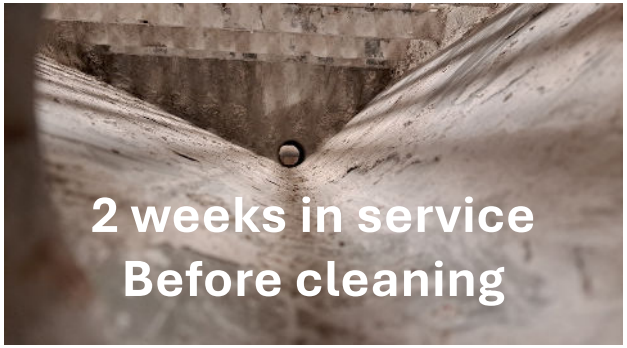
Excess vacuum pressure
Favors inhomogeneity and delamination

Excess vacuum pressure bocks free water exit downwards
The sheet elongates and fall dwn

Separator and vacuum box body is self cleaning
suction gaps are cleaned by running machine



A second box is working alternative, when



THE VACCUM SYSTEM IS NOT MORE THE BOTTLE NECK IN CLEANG STOP.
NONSTOP PRODUCTION CAN BE EXTENDET TO 4 WEEKS.

YIELD INCREASE BY REDUCTION OF VARIATIONES .

Constant vacuum presser and turns per mm by Soft dewatering stabilized, but there are still high remaining high variations.

	potential
< fibre refining, aligning, distribution fibre	1- 2 %
< the huge and long sediment circulation pre hydration	1-2 %
< improve thickness/density control with spring-back	1-2 %

< evaluation with help of Energy MOR and LOI (loss of ignition)

Potential for material saving are in the range of 3-6 %

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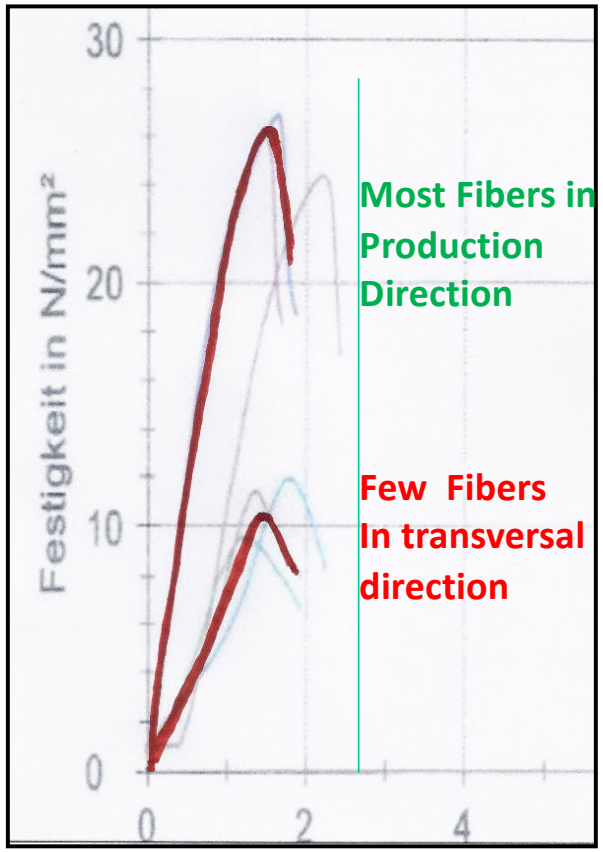
Handling and edge cracks due missing energy MOR (fibers) in weak direction



L/C ratio BS 0.38

L/C EMOR 0.25

L/C EMOR Shows real fiber distribution

Increasing the fibres in the weak direction ca. 10-15 % and Eliminate excess in the strong direction result in 10-15 % fibre saving

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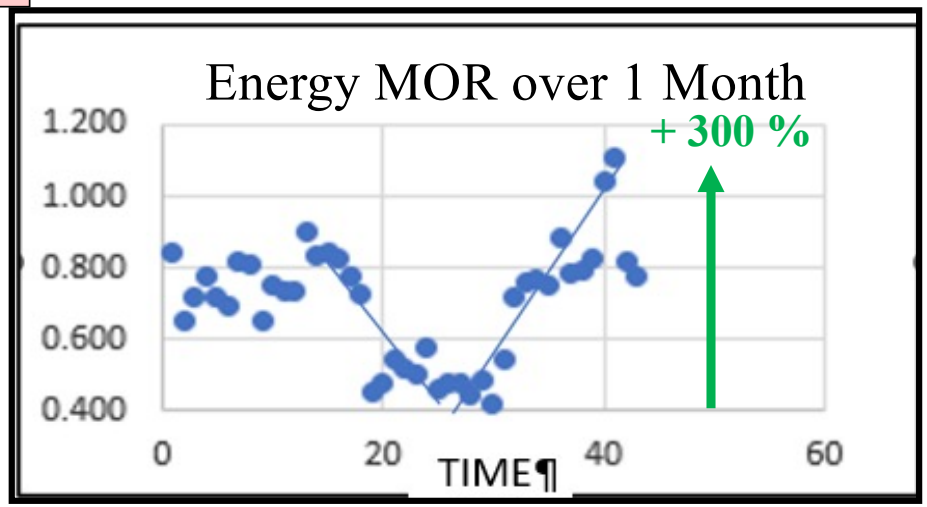
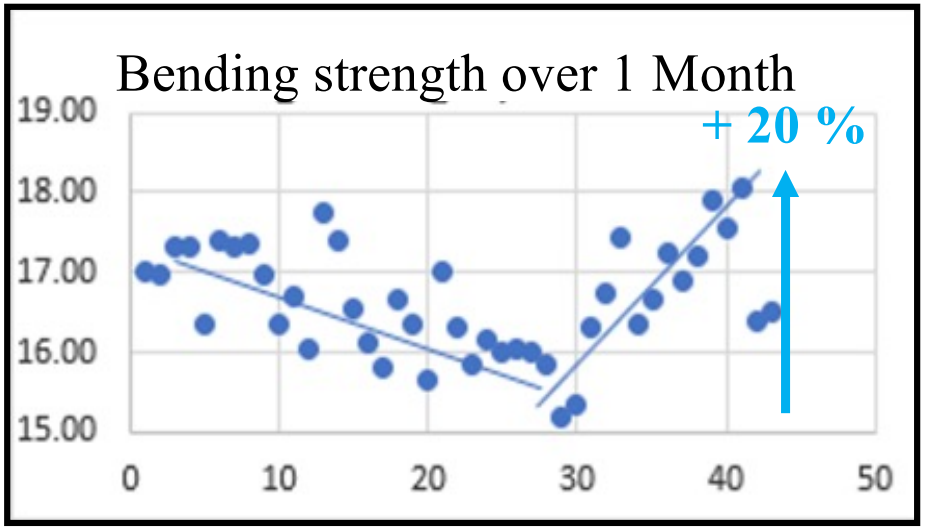
BENDING STRENGTH VERSUS ENERGY MOR





ENERGY MOR IS MORE EFFECTIVE TO DEDECT HANDLING CRACKS.
THE RANGE FROM LOW TO HIGH IS PLUS 300%
IT SHOW THE FIBER CONDITIONS AND EFFICIENCY.

THE BENDING STRENGTH IS NOT SO EFFECTIVE, TO DEDECT HANDLING CRACKS.
THE LOW TO HIGH IIS PLUS 20 % ONLY

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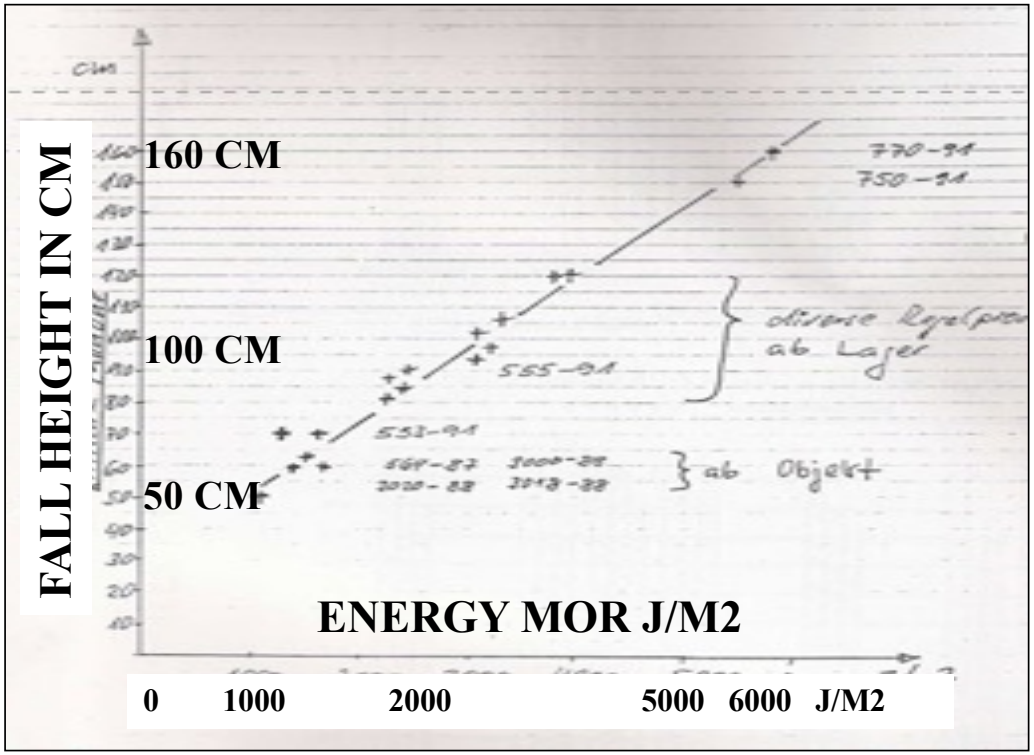
50 KG BAG FALL TEST AND ENERGY MOR,WORK OF FRACTURE



AFTER A FEW YEARS DOING THE FALL TEST, WE REALIZED THAT WE HAVE THE FALL HIGHT ALREADY FROM THE TESTING MACHINE.

All corrugated sheets teste from this graphic, have about the same Bending strength and give higth from 0.5.1.6 m fall higth

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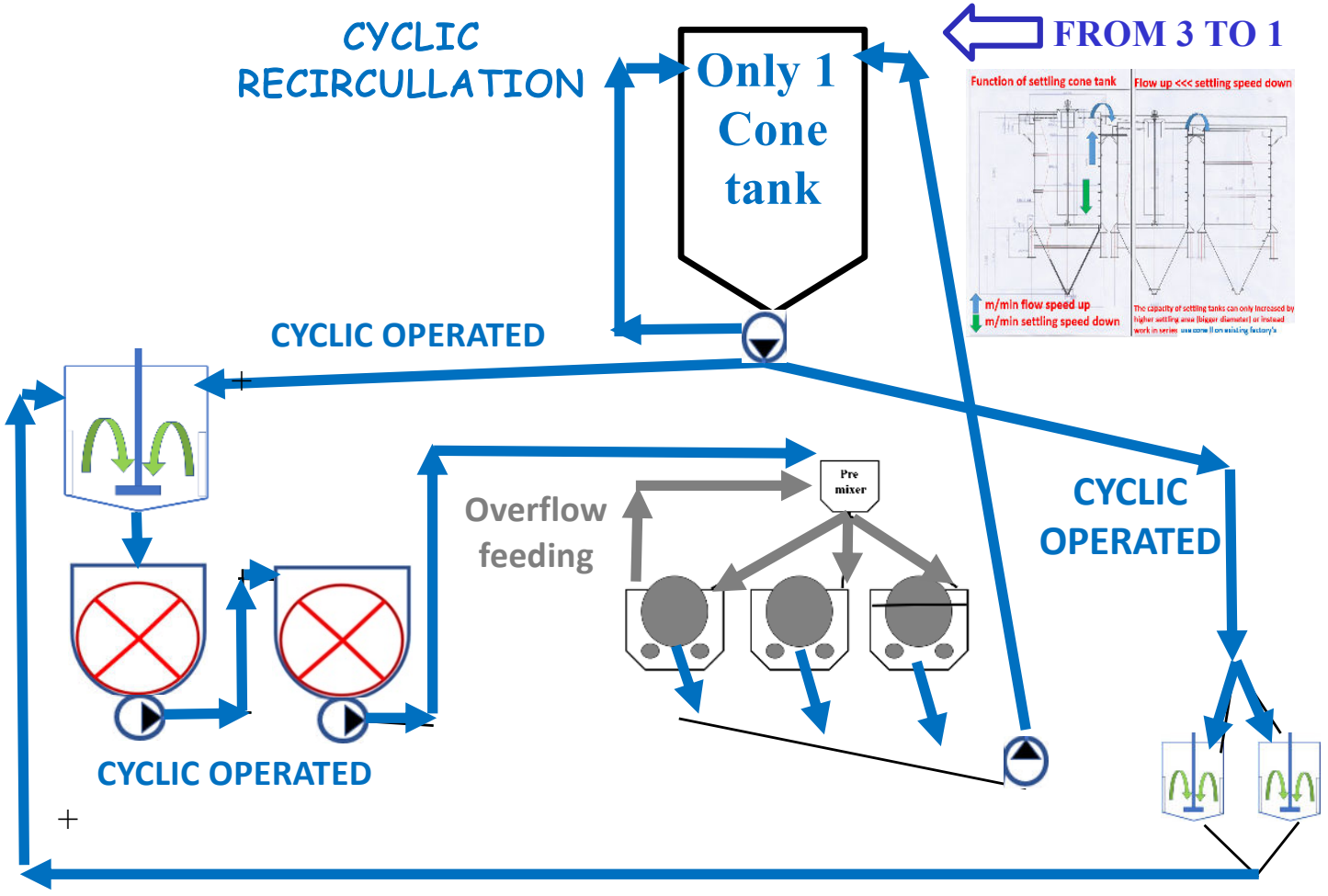
Huge water stuff circuits are sources for high variation

Before soft dewatering, these variations were covert from variating in vacuum



SEDIMENT AGING CYCLIC	
Aging time	min
Cone	20
Final mixer	10
2 Storage tanks	60
2 waste dissolver	30 min
Total average	120 min

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Batching of cutting waste and lost sheets is not good solution for thickness control

The differences from pre hydration time are much bigger than the small dosage differences in consistency by constant and continuously consumption of the waste cut.

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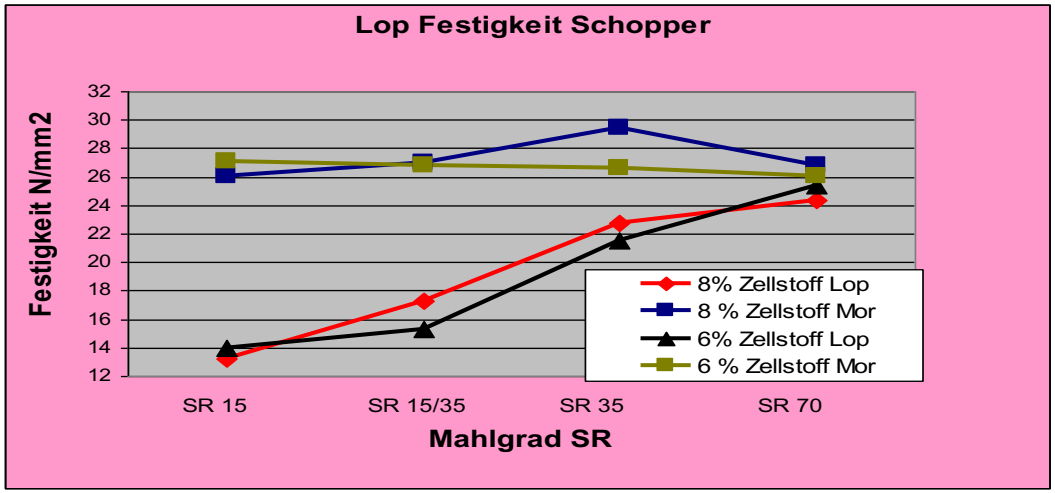
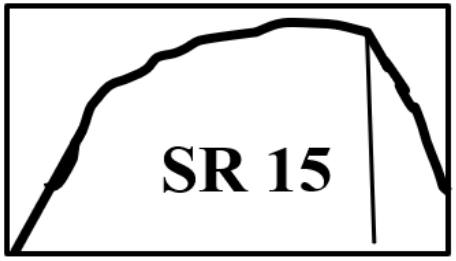
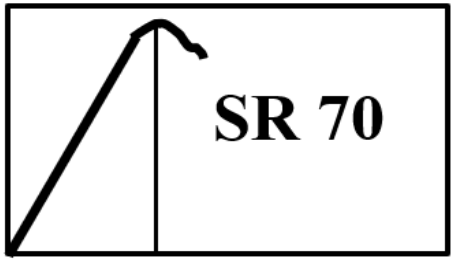
REFINING GRAD REDUCE DRAMATIC ENERGY MOR,





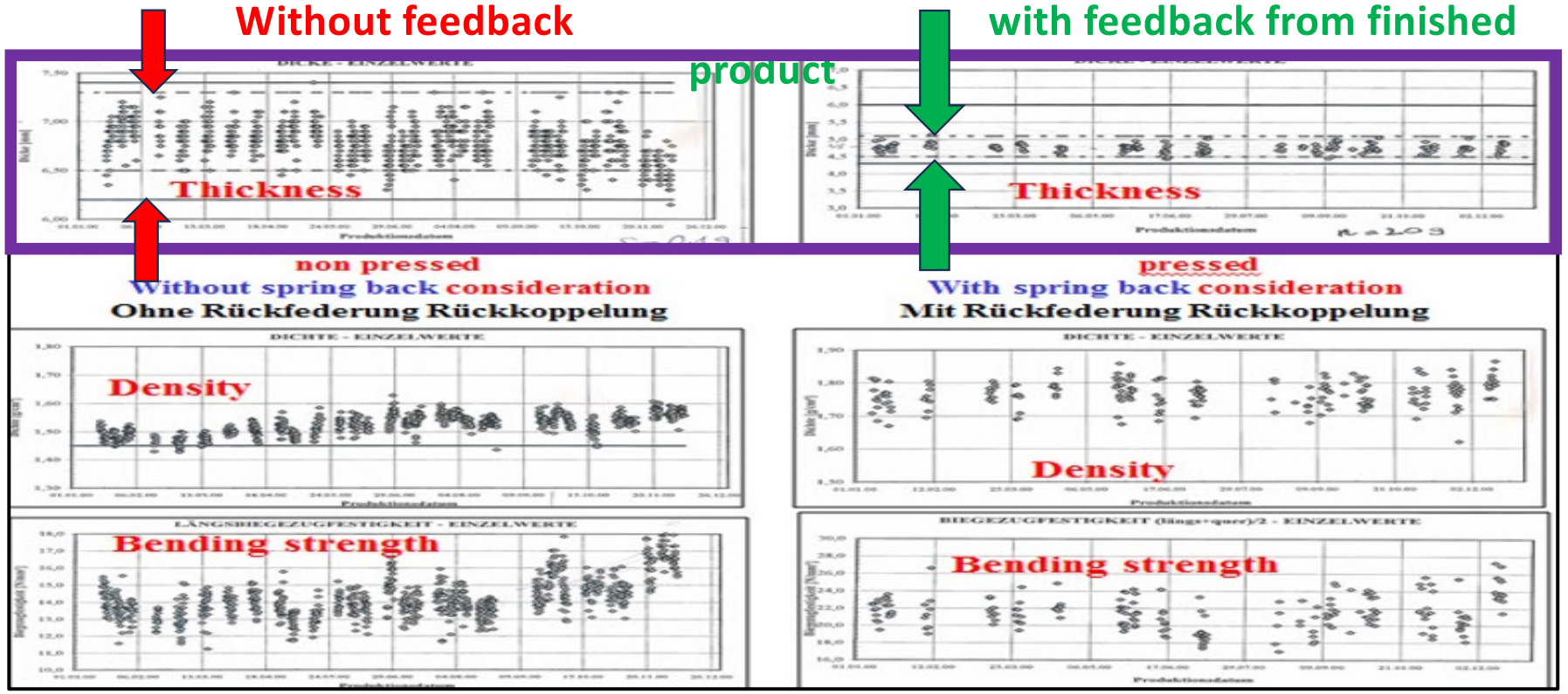


DRAMATIC OF LOP WIITH REFINING FROM SR 15 TO SR 70, REDUCE PROPORTIONALLY THE ENERGYMOR (WORK OF FRACTURE).

REFINING GRAD INCREAS CRACKS

Sophisticated, automatic Thickness control over density

need feedback with thickness from finished product



Thickness

Density

Bending strength

NO BIG REDUCTION IN STANDARD DEVIATION BY THICKNESS CONTROL WITHOUT FEEDBACK

SUBSTANTIEL REDUCTION INSTANDARD DEVIATION WITH FEEDBACK FROM FINISED PRODUCT

Raw material waste by over thickness

Missing functional thickness regulation

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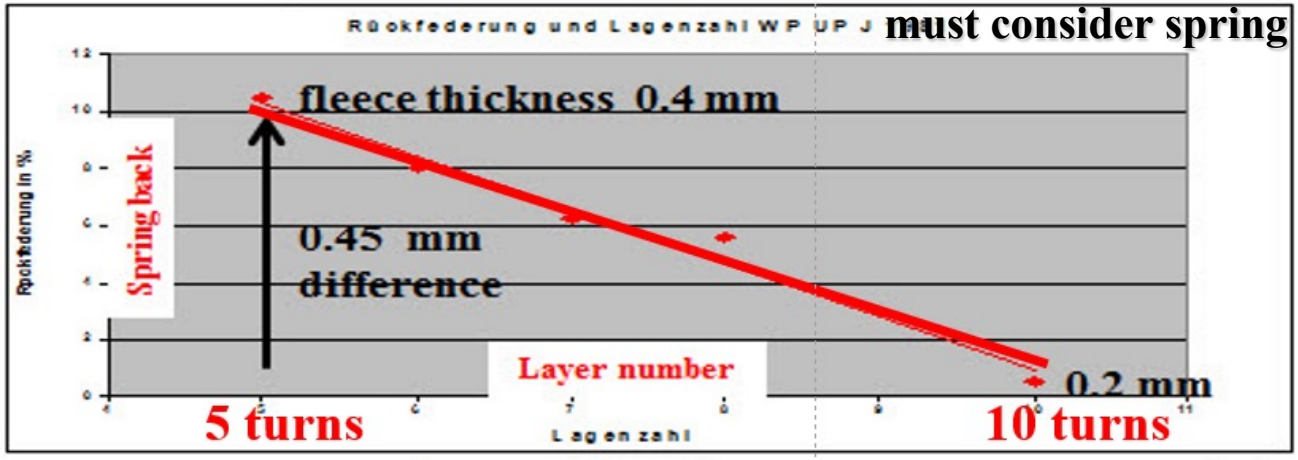
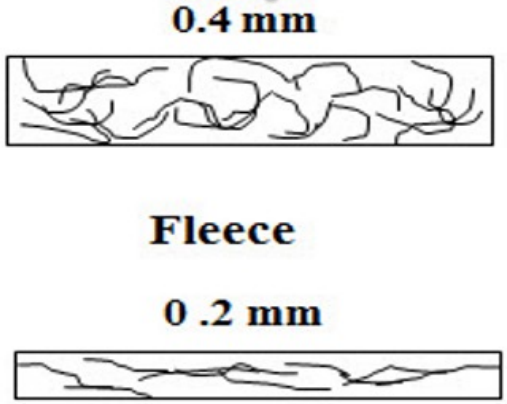
SPRING BACKT

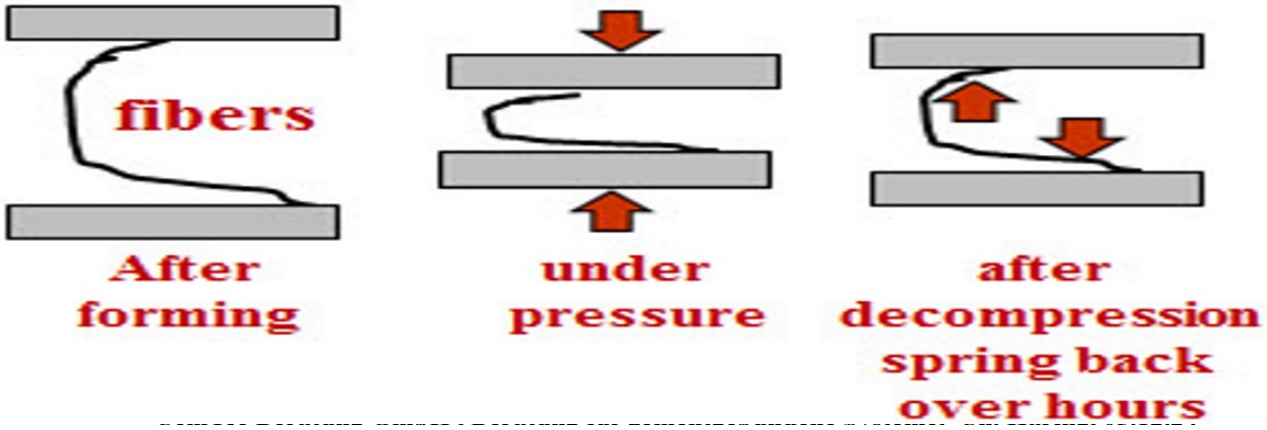
hickness control systems over density

must consider spring back





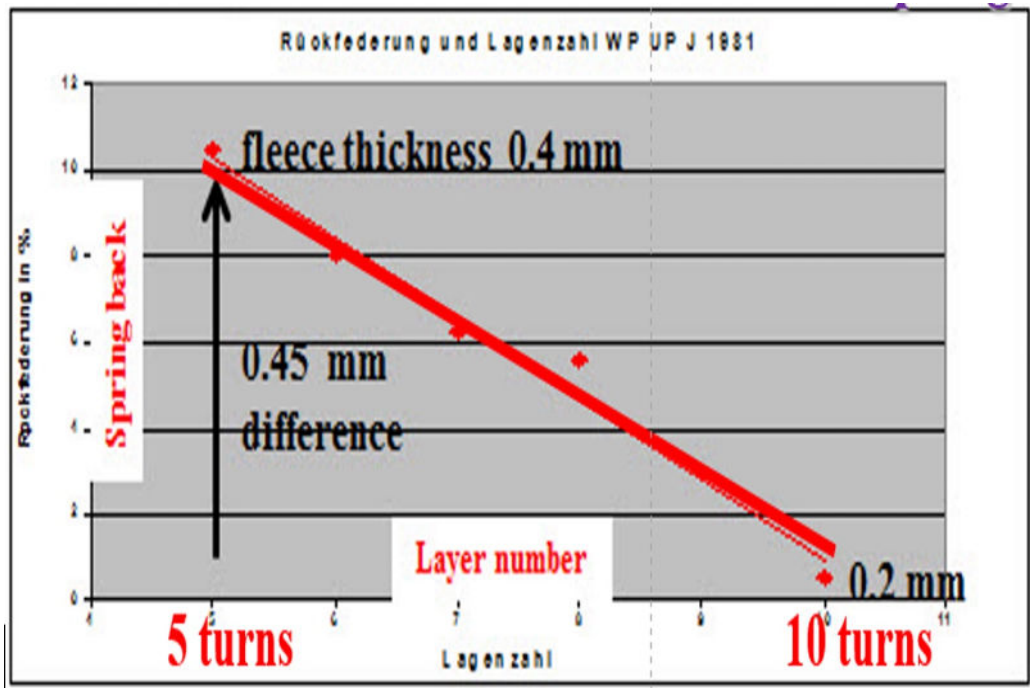
Reduction 1 turn by 5mm sheet, spring back increase finished sheet 0.1 mm or 2 %



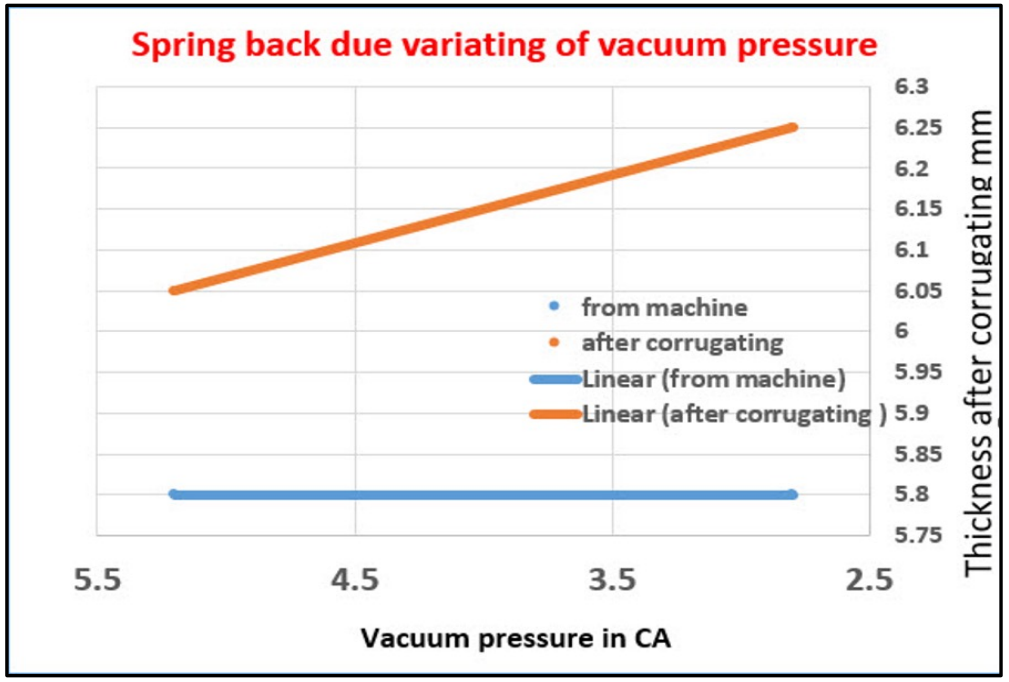
Without constant fibres Content, vacuum pressure, sediment age, sediment volume and consistency, turns per mm, spring back and standard deviation cannot be reduced.

Soft dewatering reduced Spring Back

Constant vacuum pressure and turns per mm reduce a big part of spring back-



Reducing 1 turn by 5 mm sheet, spring back increase the finished product 0,1 mm or 2 %s



By reduction of 2.2 m water pressure by 6 mm sheets, spring back increase finished sheet 0,2 mm or 3 %

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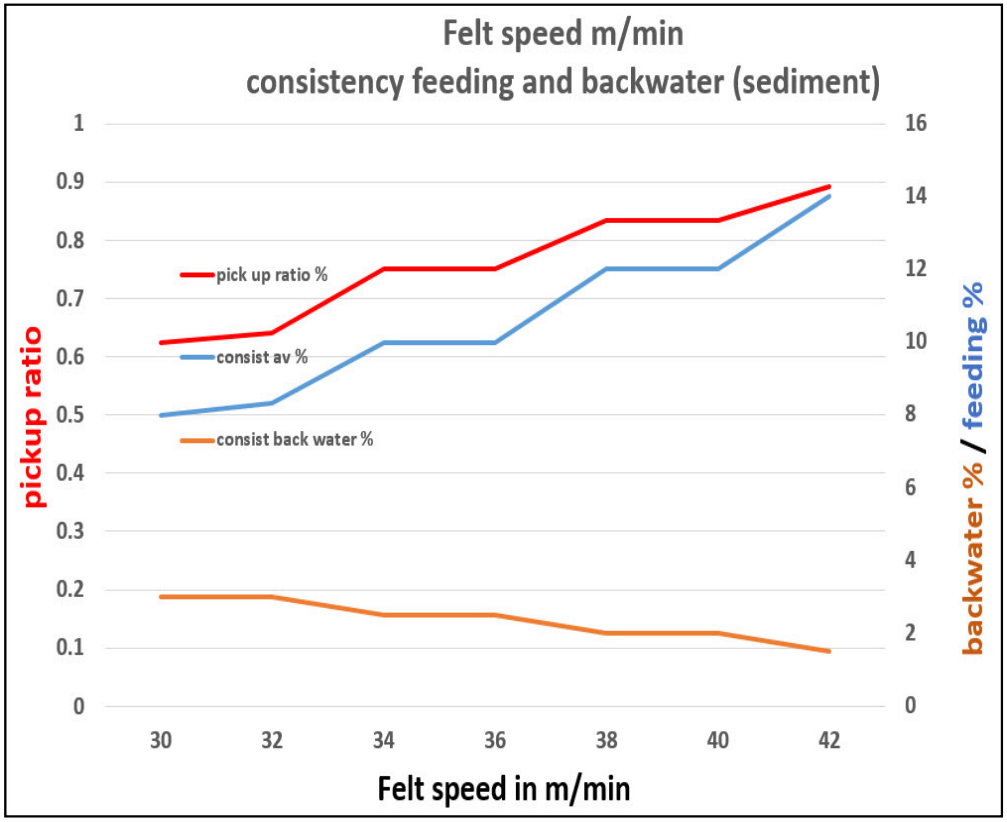
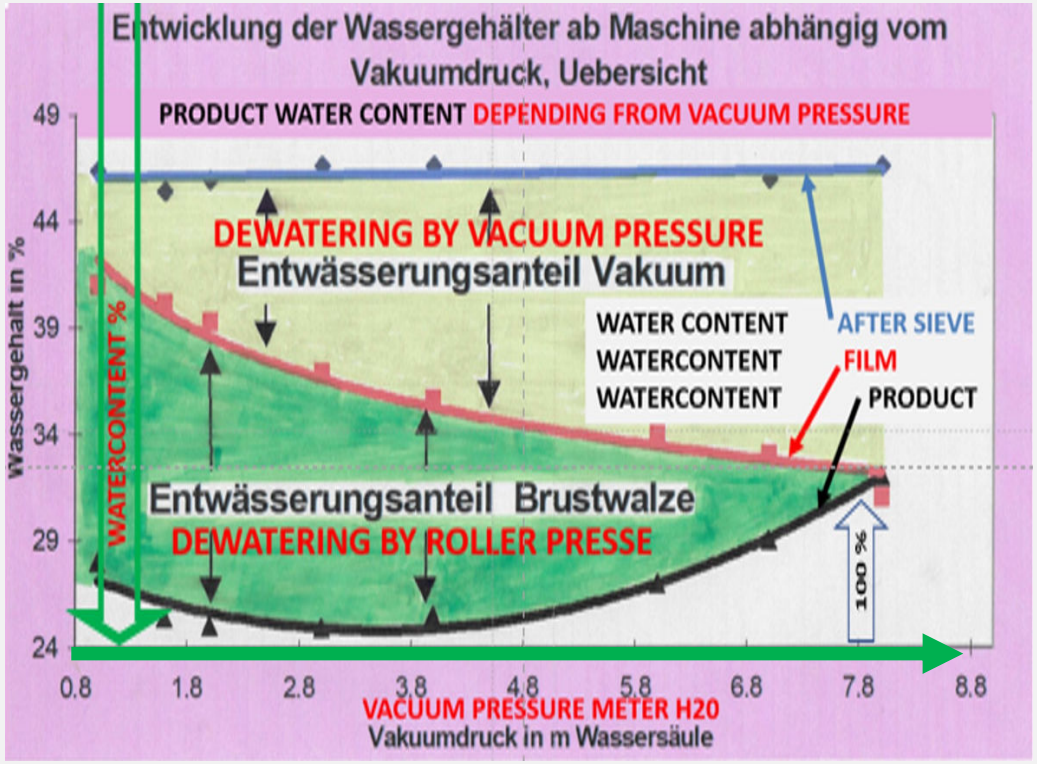
Thickness control with machine speed is not an option

Each adjustment create new differences, pick up ration, sediment, feeding



Transfer higher part of dewatering from vacuum to roller press dewatering

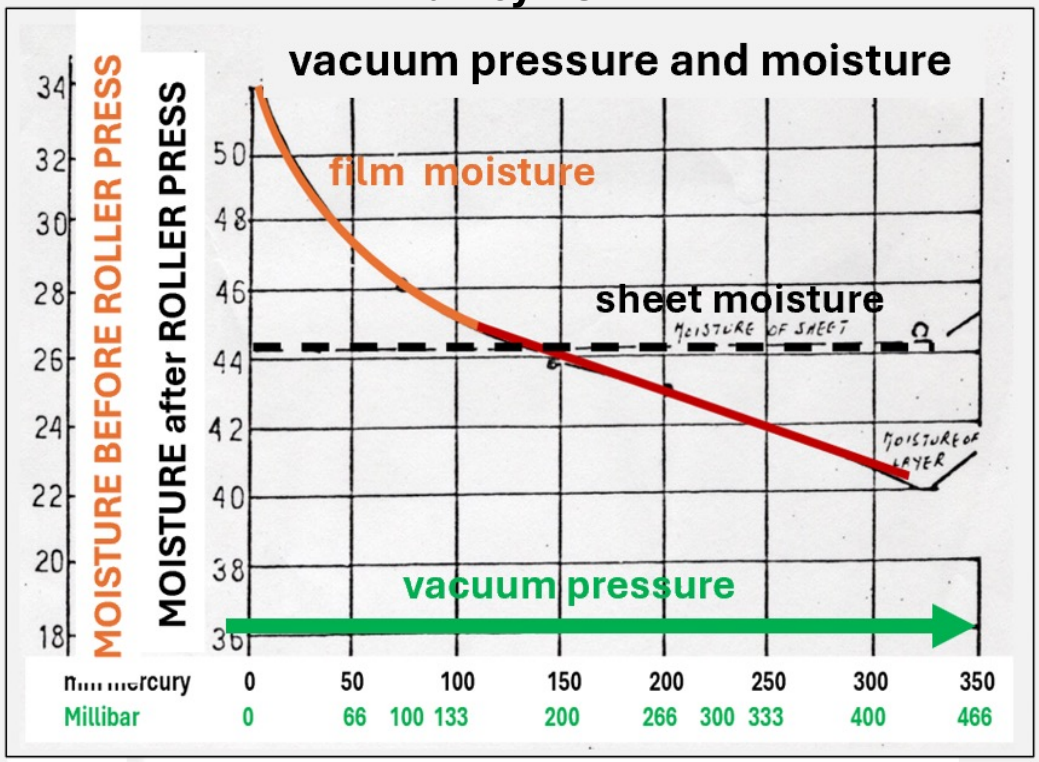
Machine in EUROPE with keeping boxes 80 m/min



Black curve

Vacuum pressure reduce product moisture only till 2 mH2O vacuum pressure,
Over 3 mH2O moisture it is increasing

Machine without keeping boxes 30 m/min
Burney RU



Vacuum increase till 4 mH2O do not change Product moisture

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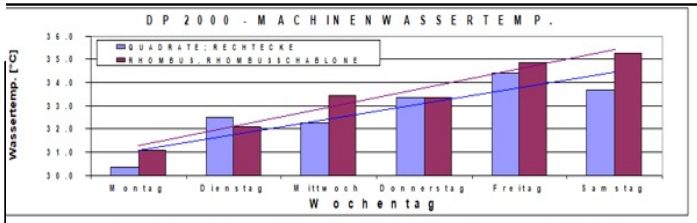
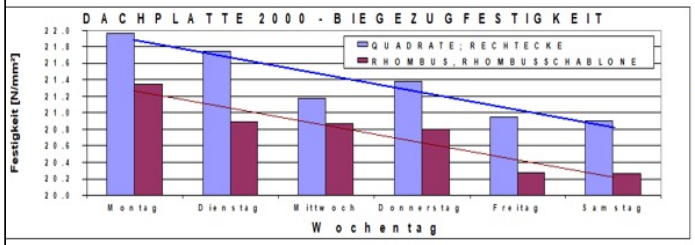
Process water temperature, vacuum pressure, bending strength and delamination development

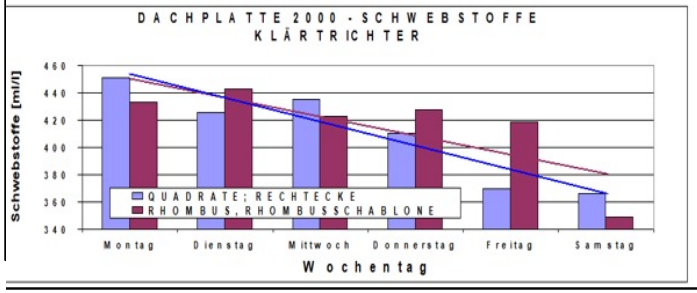
Water temperature bending strength



Process-water Temperature

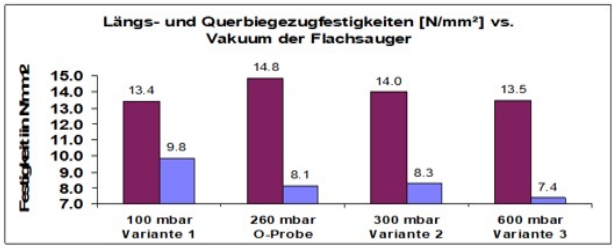


Bending strength down, through delaminating



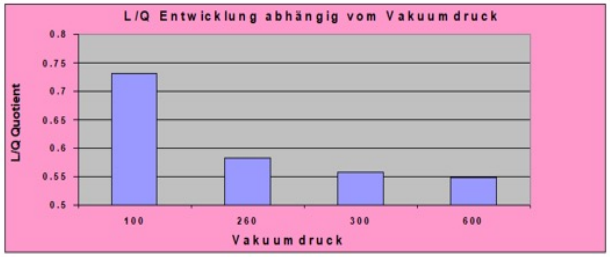
Sediment

Vacuum pressure and length / cross ratio

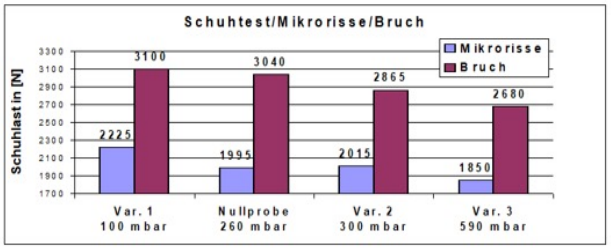


Highest strength in strong direction by 2.6 m

Highest strength in weak direction by 1 mH2O



Highest L/C ration by 1 mH2O



Highest shoe-test load by 1 mH2O

ONE PART OF BENDING STRENTH LOSS, IS IN BOTH CASES PROVOOCKED BY BEGINNING DELAMINATION DUE HIGH VACUUM PRESSURE

The hydration contributes very much to the variation in yield
But we can use it to contribute to yield increase

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Massen-Volumen-änderung Hydrat. Karbonat

Mass and volume change by 100 % hydration + 100 % carbonation

Gewichtszunahme durch

Hydratation	**25 %**
Karbonatisierung	**9 %**

Weight increase by:

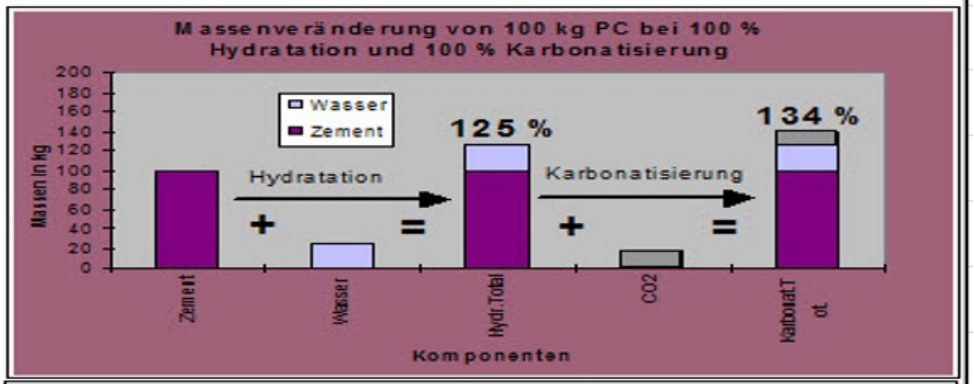
Hydration	**25 %**
Carbonation	**9 %**

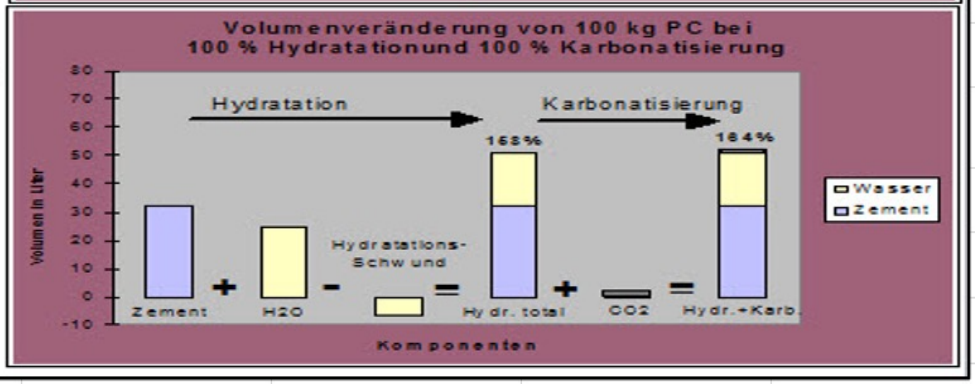
Volumenzunahme durch:

Hydratation	**58 %**
Karbonatisierung	**6 %**

Volume increase by:

Hydration	**58 %**
Carbonation	**6 %**





If cement can

Hydrate100 %,

On can gain

25 % weight

of raw material

And 60 % volume

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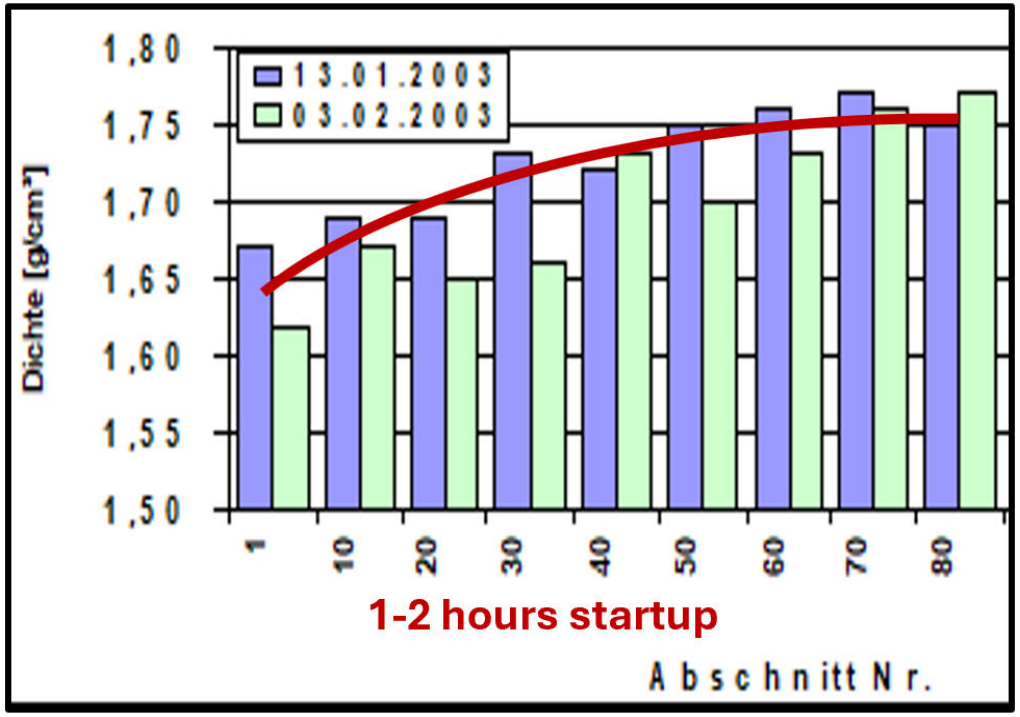
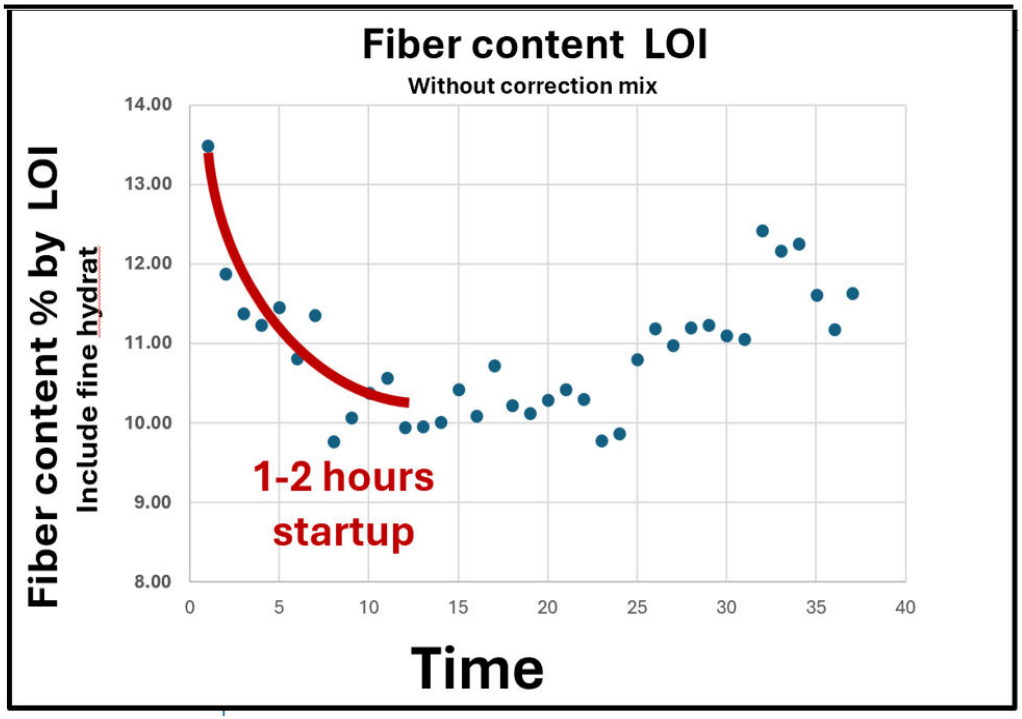
EXCESS FIBERS THE FIRST HOURS IN A NÊW START

Method to Determinate fibre excess by startup





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Too big variation in silica grinding cause also Bending strength variations