

IVAN JOEDY

Glyoxalated Polyacrylamide As A Dewatering Booster in Recycled Furnish

kemira



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2. Theory about GPAM & Dry Strength
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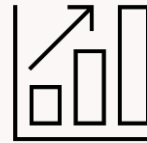
Approach to Further Enhance Conventional Strength Program



**FIBER
SAVINGS**



**QUALITY
UPGRADE**



**INCREASED
PRODUCTION**



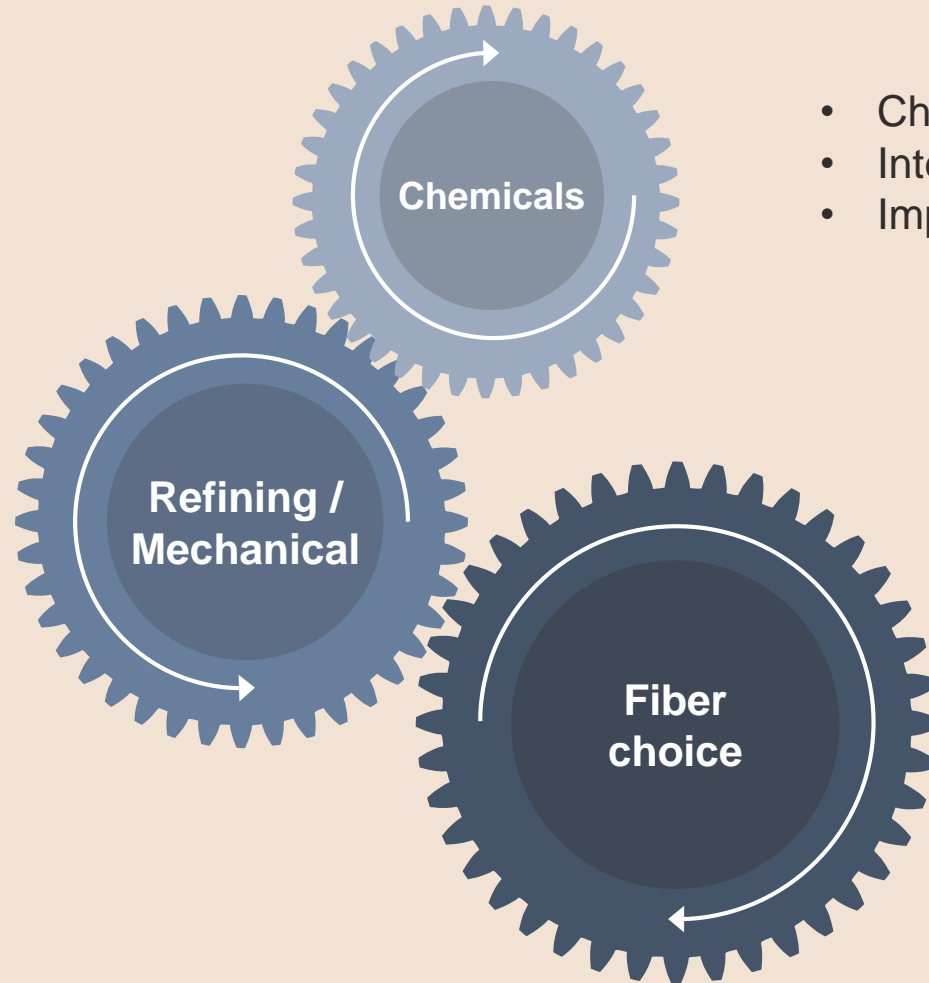
**ENERGY
SAVINGS**



**CHEMICAL
SAVINGS**

Synergy for Strength Improvement

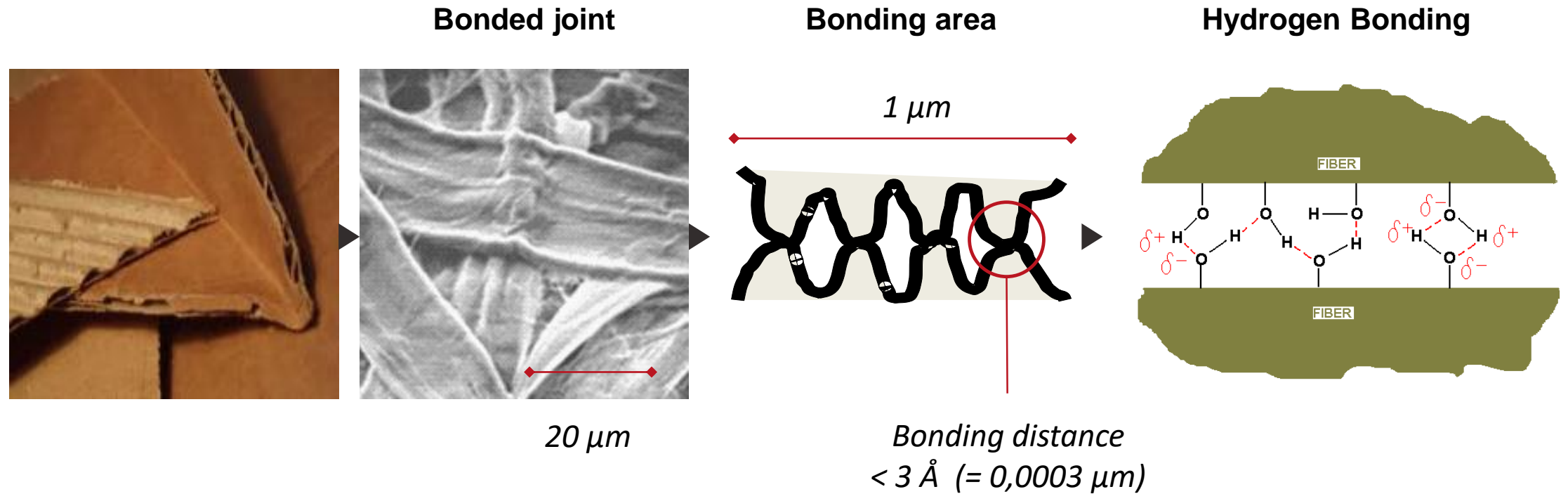
- Energy cost
- Reduced dewatering
- Loss of bulk
- Dust



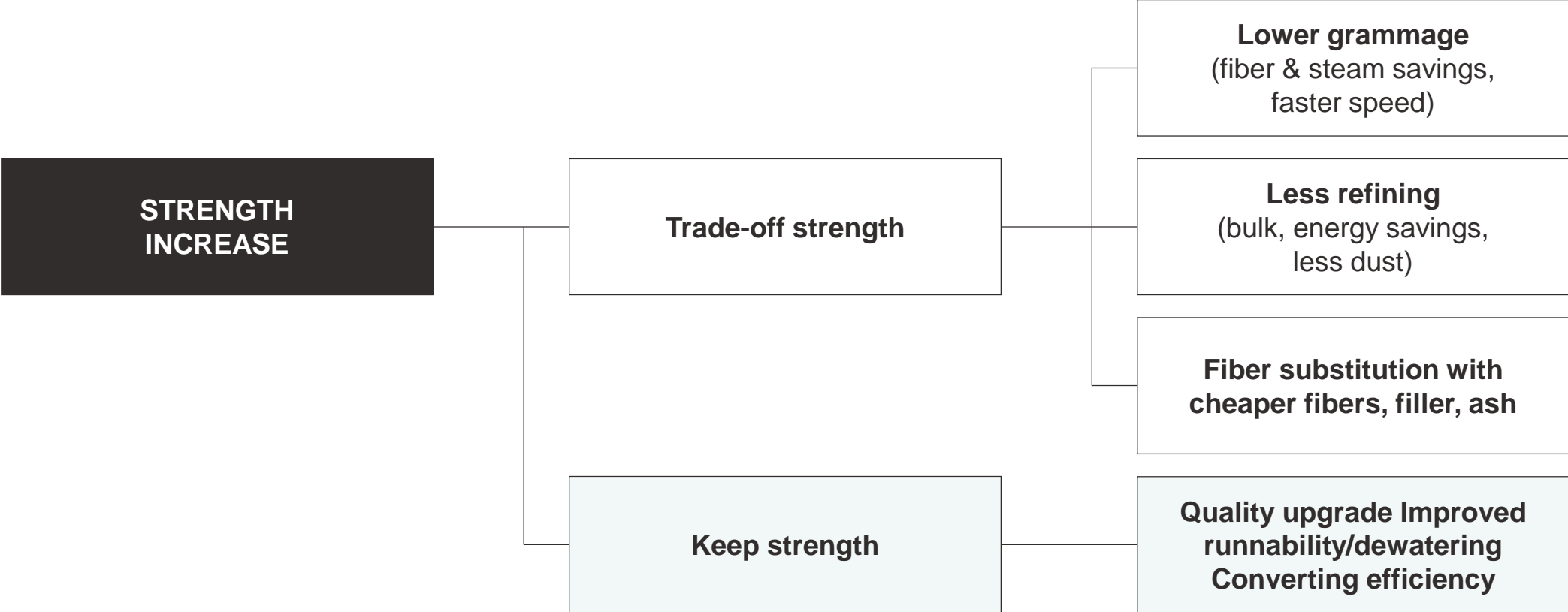
- Chemical cost
- Interaction with other additives
- Impact on machine runnability

- Virgin fibre cost
- Recycled fibre quality

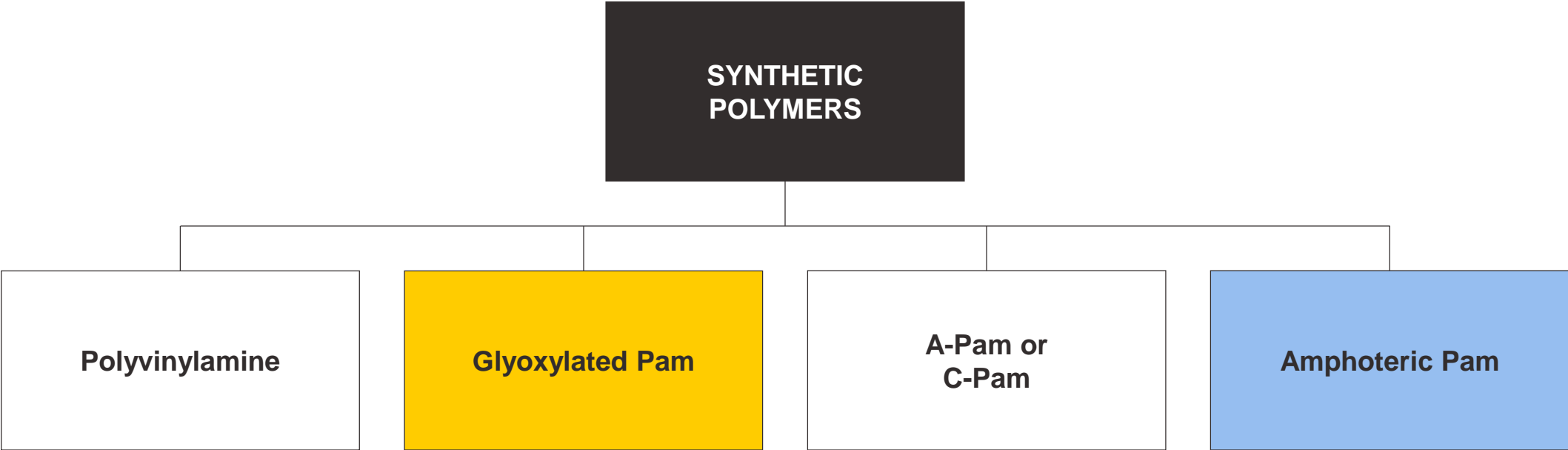
Fiber-fiber bonding requires close distance



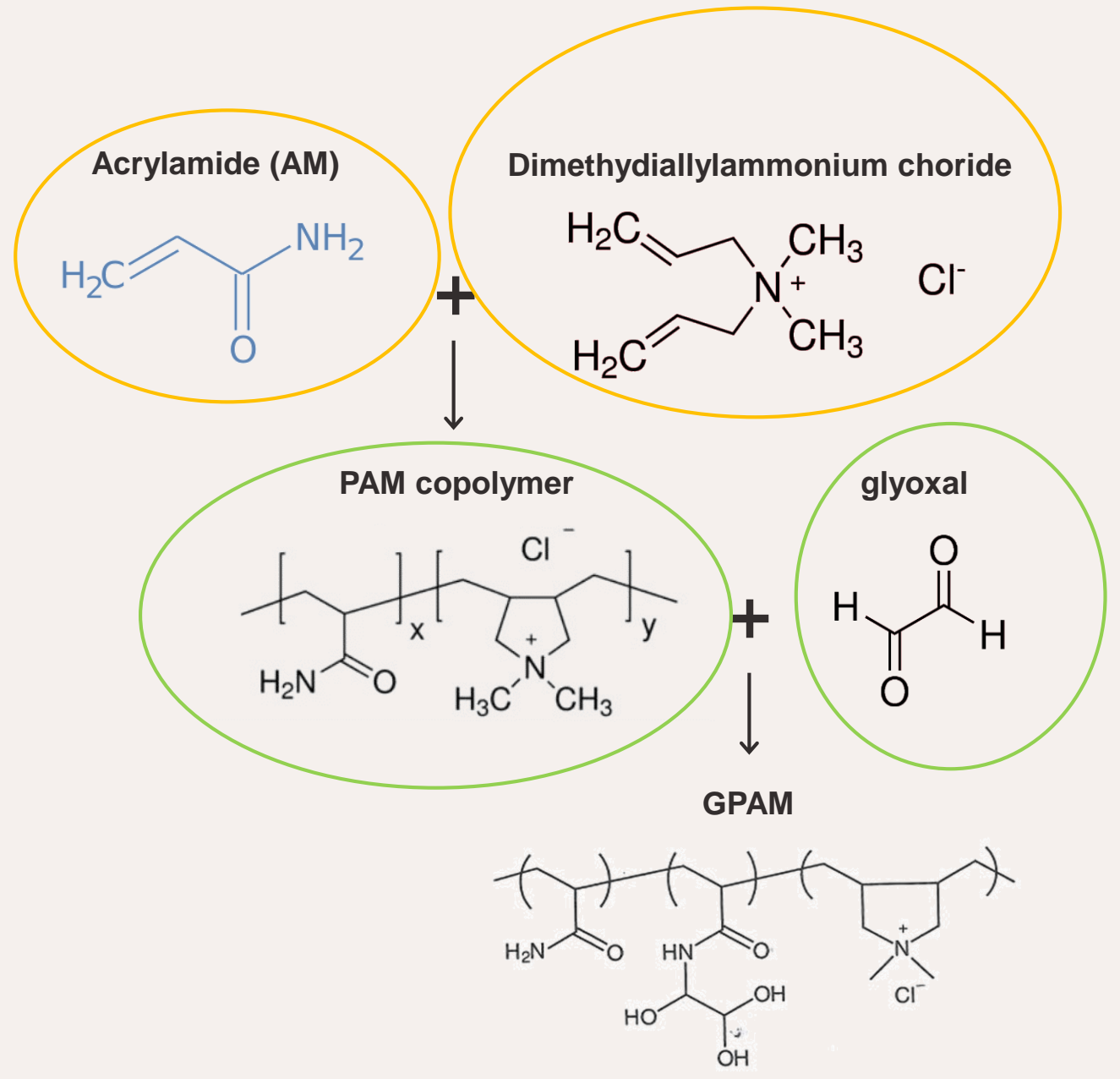
When Strength Improved



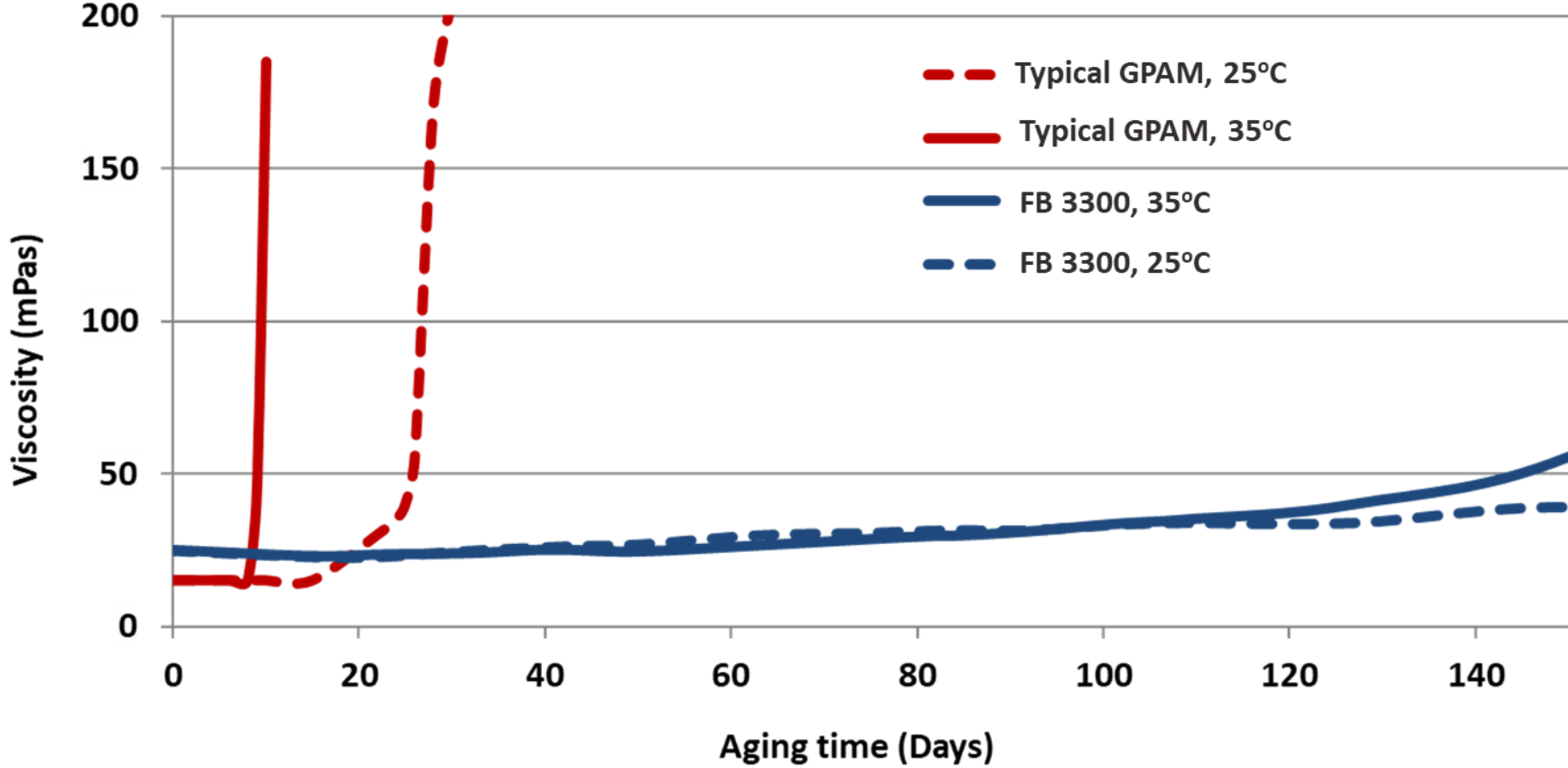
Dry Strength Choices



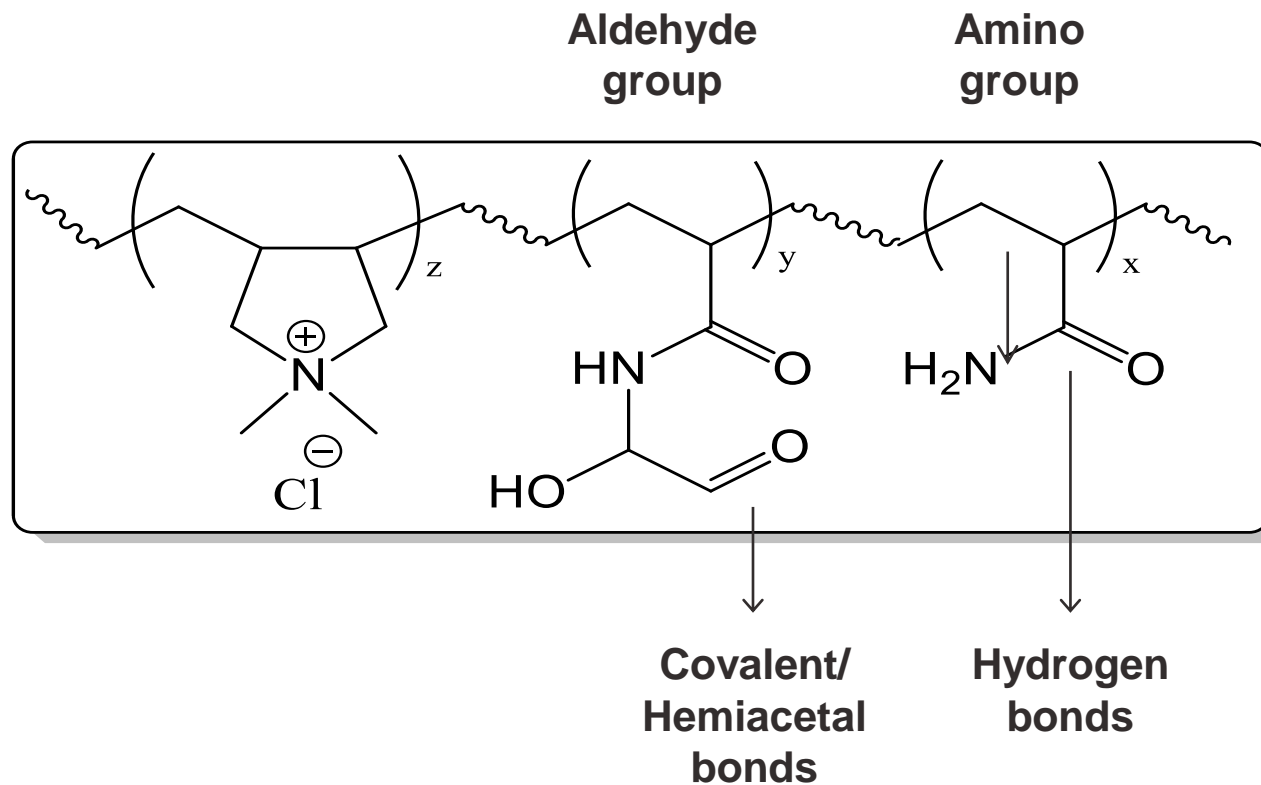
How GPAM is made



Kemira GPAM (3300) with significant improved stability



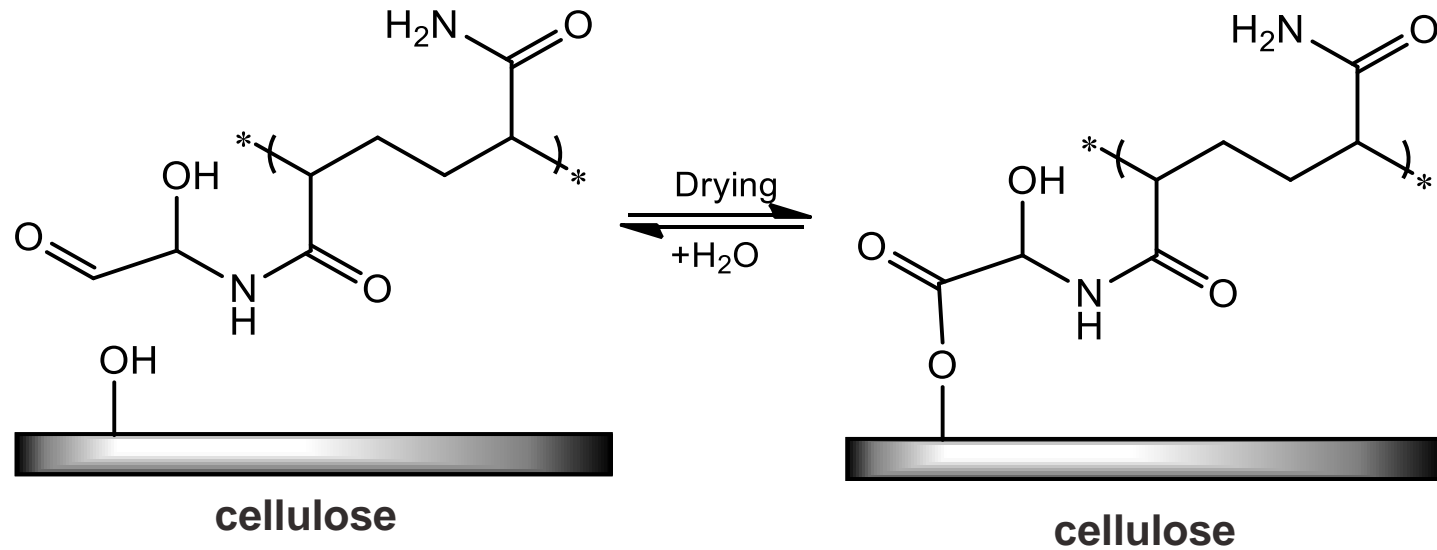
GPAM Interactions with fibers



FennoBond 3300 is a **high-charge GPAM**

- Less affected to anionic trash
- Less sensitive to high conductivity

Positive Benefits of GPAM



Benefits

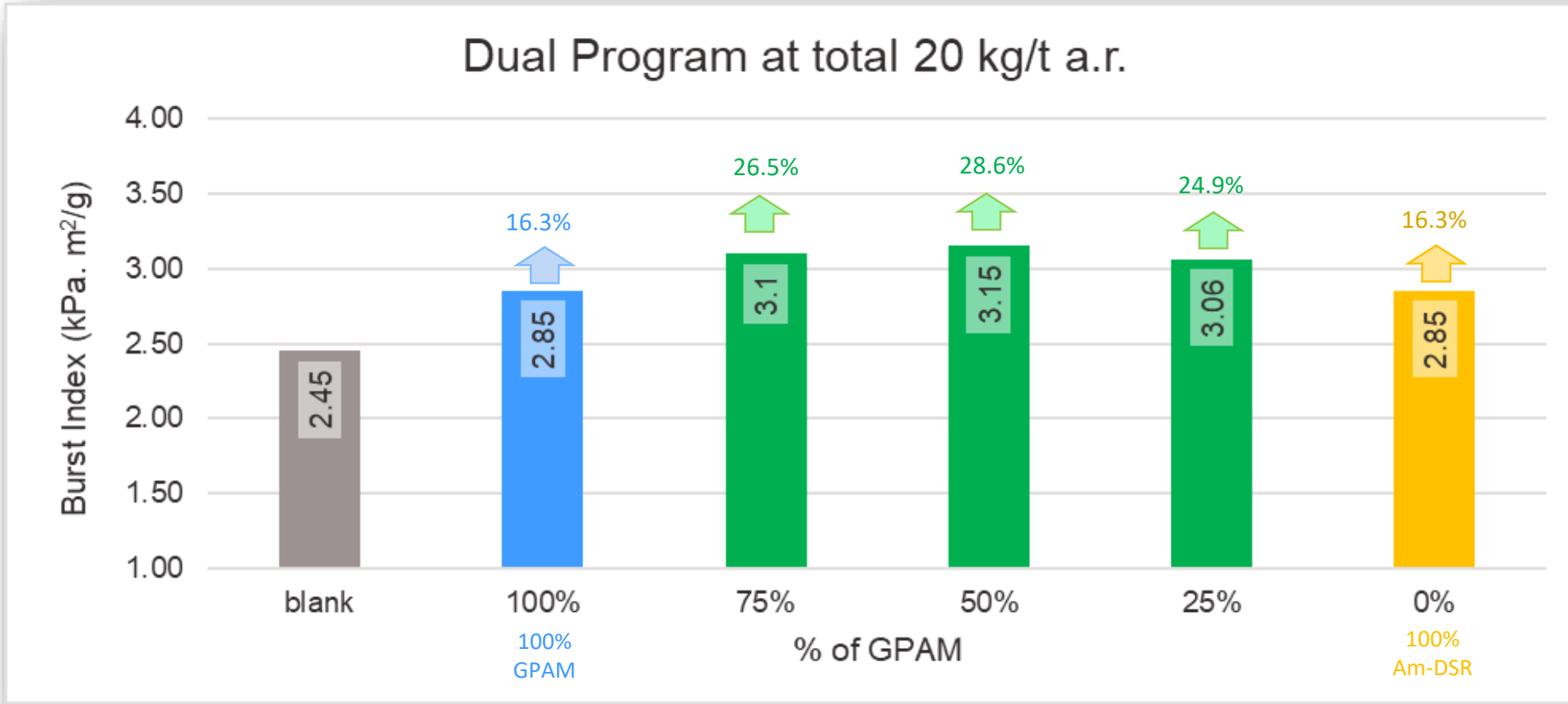
- Dry strength
- Temporary wet strength
- Wet web strength
- Dewatering
- Retention

Laboratory Testing



Effect of single strength vs combined strength program to strength

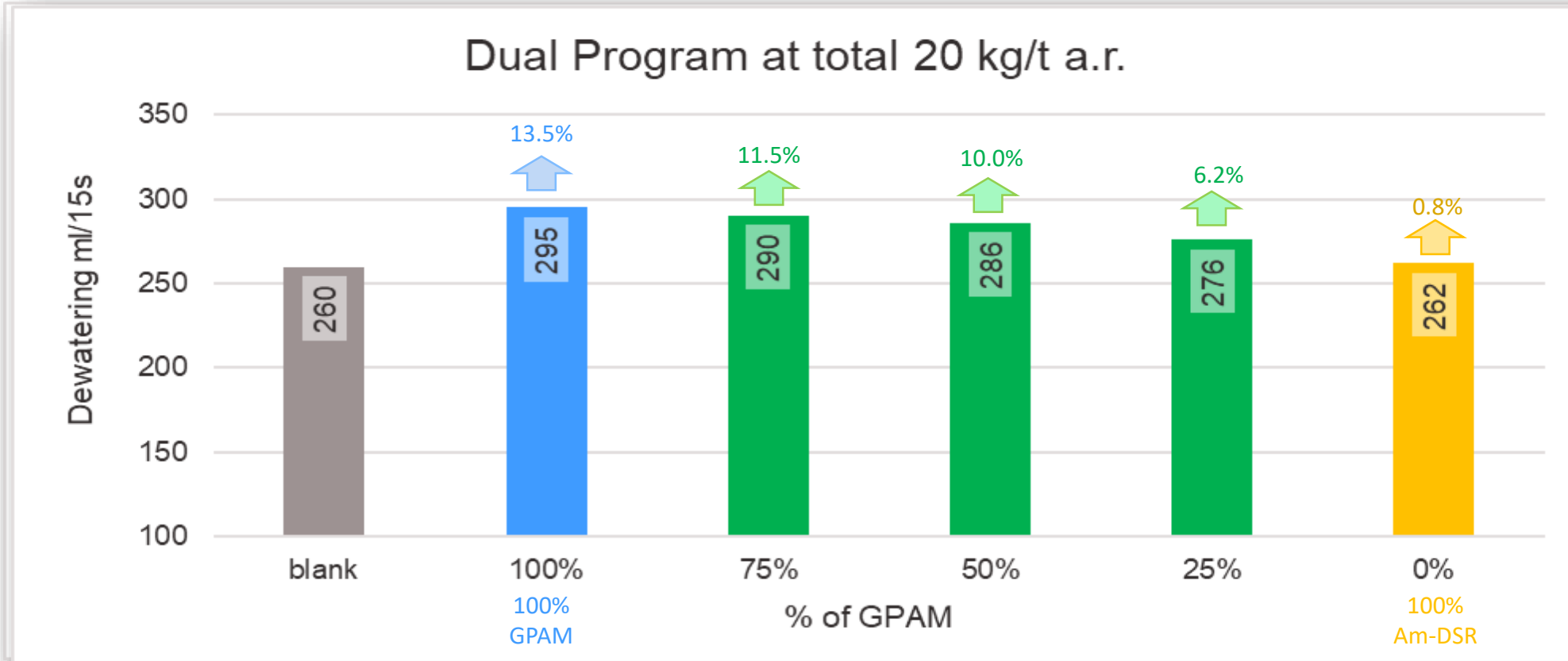
Experiment condition : 100% SEA OCC, Conductivity 2,700 $\mu\text{S}/\text{cm}$, pH 6.58, 150 gsm handsheet, fixed retention chemicals



- GPAM tested has ability to replace 1:1 of the Am-DSR
- Combined GPAM and Am-DSR give significant higher strength improvement than only single component

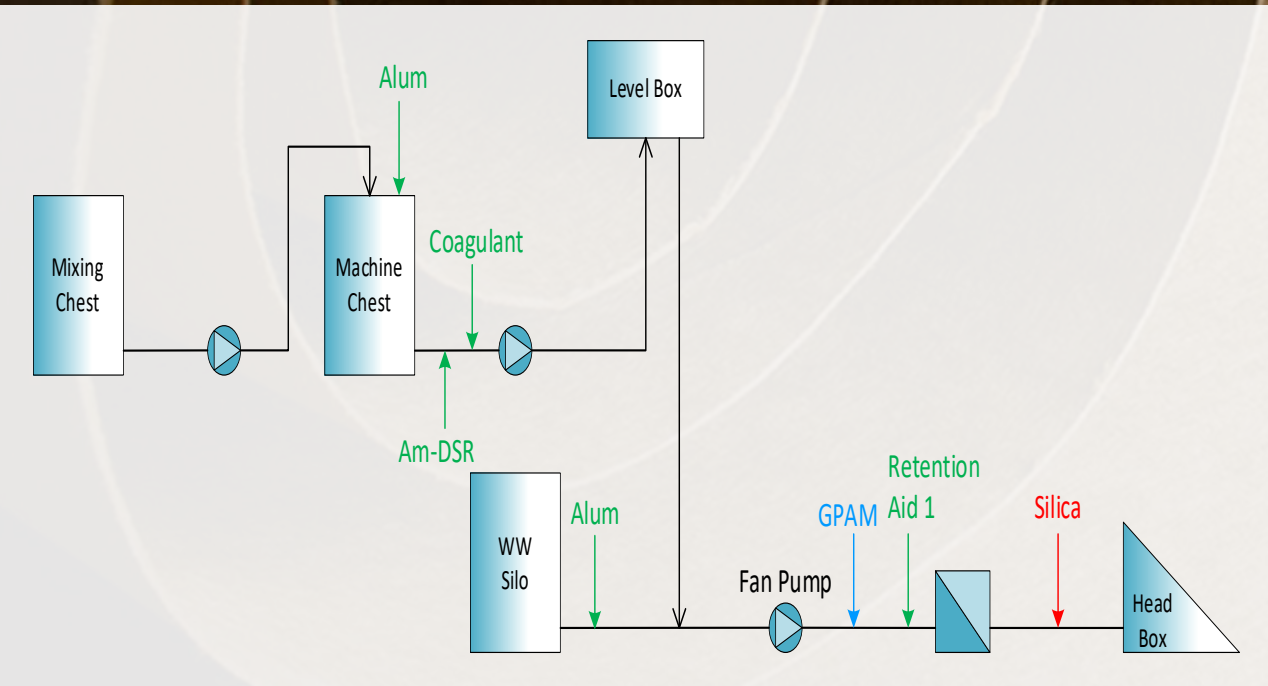
Effect of single strength vs combined strength program to dewatering

Experiment condition : 100% SEA OCC, Conductivity 2,700 $\mu\text{S}/\text{cm}$, pH 6.58, 150 gsm handsheet, fixed retention chemicals



- GPAM by itself give improvement to dewatering rate
- Additional GPAM on top of Am-DSR gives improvement to the dewatering with potential strength improvement.

GPAM Replacement for Retention in Recycled Paper Bag



MACHINE OPERATION

Single ply, fourdrinier machine, 560 m/min
30% recycle OCC, 55% mixed waste, 15% Broke
pH 6.5 - 7.0
55 – 80 gsm paper bag

CHEMICAL ADDITION

Alum = 15 kg/t (total)
Coagulant = 0.5 kg/t
Am-DSR = 7.0 kg/t

Retention Aid 1 = 0.5 kg/t
(optimized from 0.7 to 0.5)
GPAM = 1.2 kg/t (added)
Silica = 1.2 kg/t (removed)

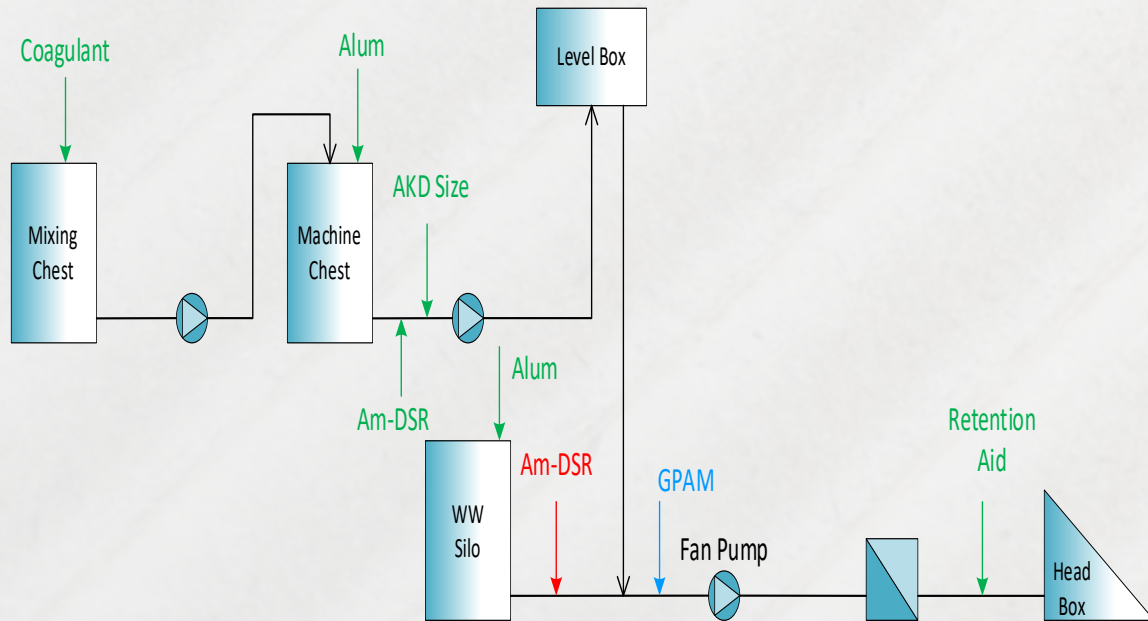
TARGET :

More cost-efficient retention program
Maintaining tensile and burst strength & formation

RESULTS:

~ 5% higher MD/CD tensile and bursting strength
Maintained dewatering rate
~20% lower tray ww consistency and turbidity

GPAM Complementary to Am- DSR for Dewatering and Retention Enhancement



MACHINE OPERATION

Single ply, fourdrinier machine, 550 - 650 m/min
70% recycle OCC, 20% mixed waste, 10% Broke
Conductivity : 2,500 – 3,500 $\mu\text{S/cm}$, pH 6.5 - 6.8
85 – 125 gsm Corrugating Medium

CHEMICAL ADDITION

Coagulant = 1.50 kg/t

Alum = 12 kg/t (total)

AKD size = 7.0 kg/t

Am-DSR (thick stock) = 15.0 kg/t (optimized from 17 to 15)

Am-DSR (thin stock) = 4.0 kg/t (removed)

GPAM = 6.0 kg/t (added)

Retention Aid = 0.50 kg/t

TARGET :

Maintaining strength performance and cost
Improving dewatering and retention

RESULTS:

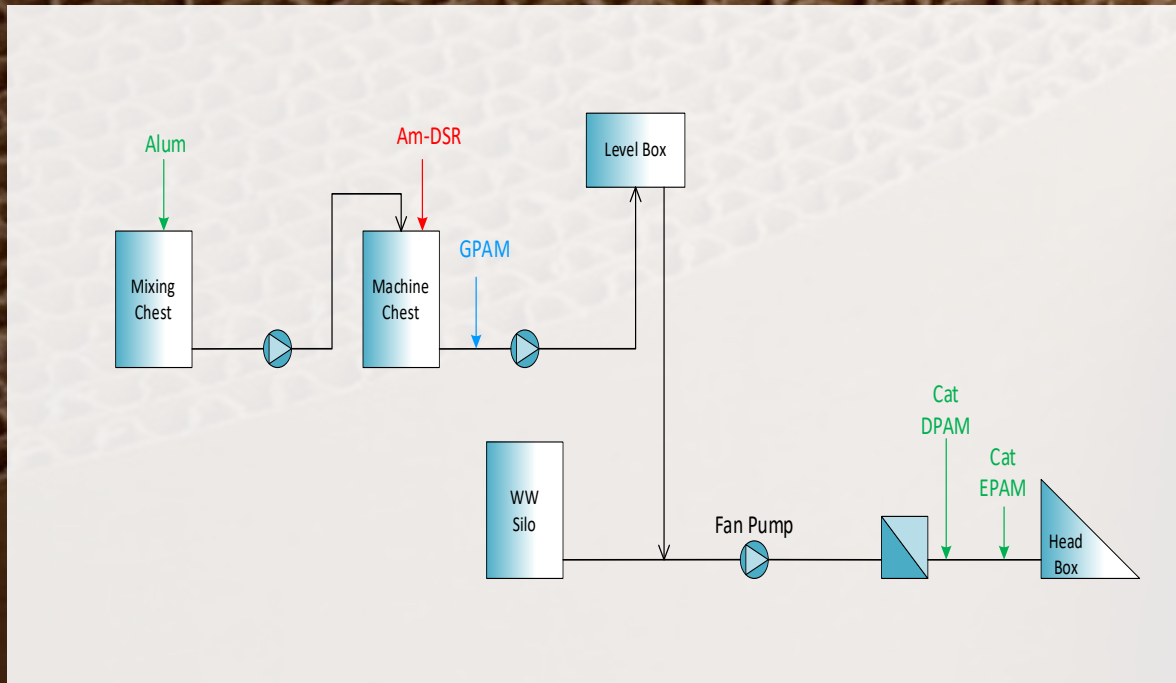
Maintained strength (RCT/CMT) at reduced Am-DSR (by 6 kg/t)

> 10% dewatering improvement

> 25% lower consistency of white water

Improved machine runnability observed by less foaming
in the system and lower effluent load

GPAM as Compliment of Am-DSR for More Efficient Strength Program



MACHINE OPERATION

Two ply, fourdrinier machine, ~1,100 m/min
93% OCC + own brokes + 7% UKP (top ply)
Conductivity : 3,500 – 5,000 $\mu\text{S}/\text{cm}$, pH 5.8 - 6.3
125 – 250 gsm - H grade linerboard

CHEMICAL ADDITION

Alum = 4.6 kg/t (total)
GPAM = 7.0 kg/t per ply (added)
Am-DSR = 30 kg/t (optimized from 40 to 30)
Dry CPAM = 0.16 kg/t
Emulsion CPAM = 0.25 kg/t

TARGET :

GPAM to reduce Am-DSR with at least maintained strength

RESULTS:

Reduced by 10 kg/t (total) of Am-DSR
Improved bursting index 3.93 (spec 3.80)
Lower cost strength program

IN SUMMARY

- FB 3300 GPAM provides long term stability and performance over time
- GPAM in synergy with Am-DSR to give benefits;
 - Reduced cost
 - Improved strength
 - Better productivity
 - Quality enhancements
 - Reduce water consumption
- GPAM is pump and go making it easy to apply



Questions

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