Advanced Sticky Control in Paper Machines using NopcoFlowCount as On-site Monitoring method

nopco

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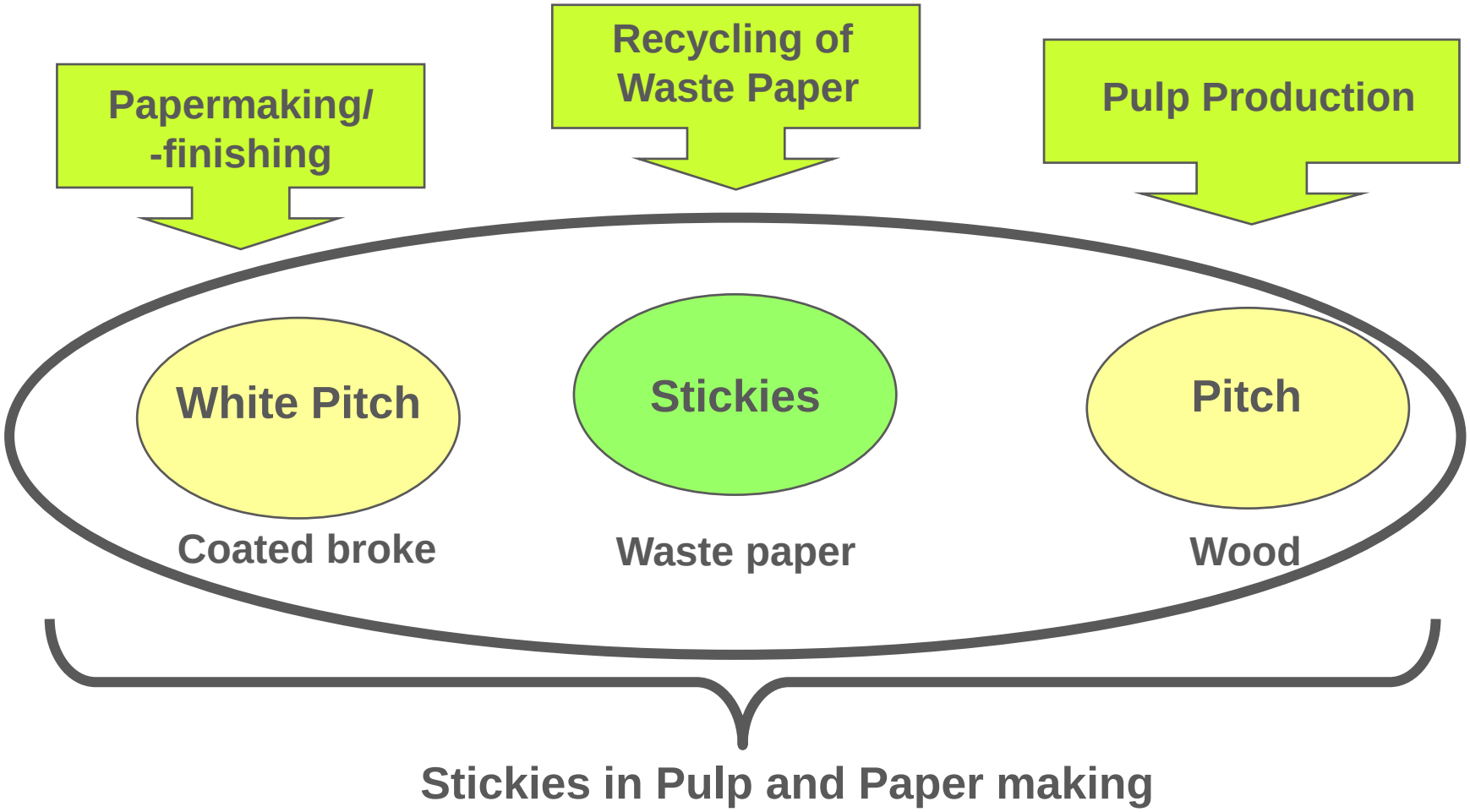
Definition



Source: A. Hamann - 2003

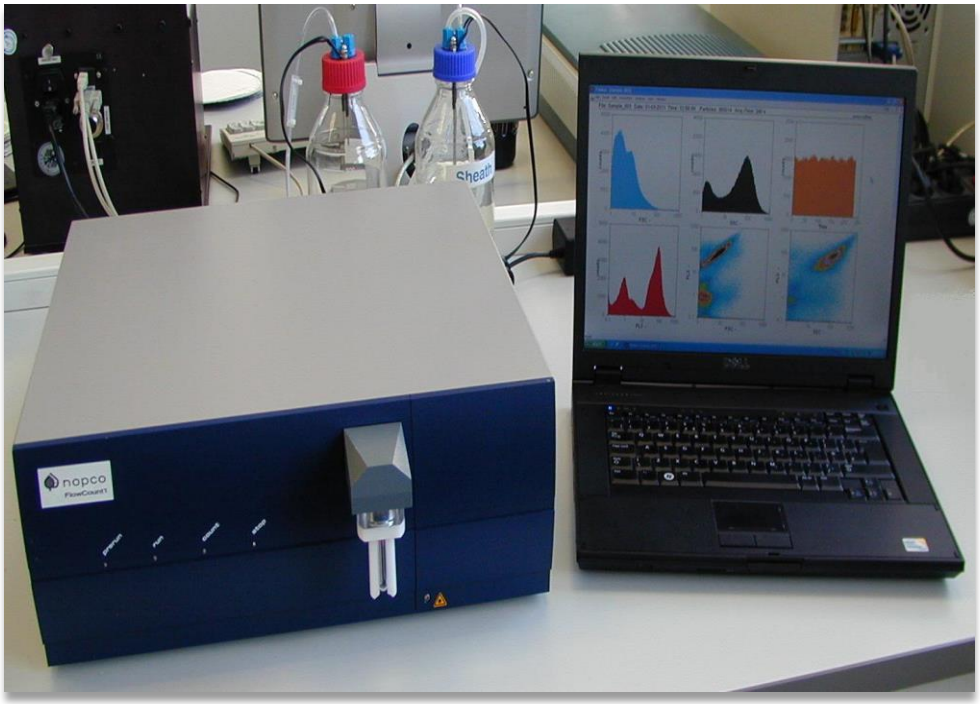
Definition

Problems of sticky control in the past:

- Determination of micro stickies
- No lab method to check performance of sticky control agents
- Monitoring of application

NopcoFlowCount

Principle: Flow Cytometry
-Method to determine sticky potential

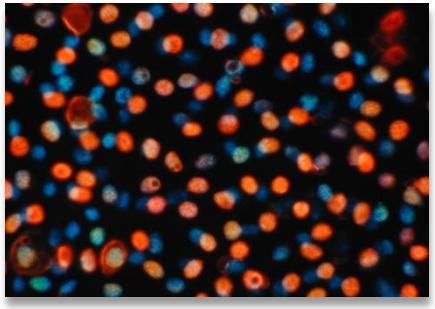


Measurement of:

- **Size distribution**
- **Number** and **Size** of particles
- **Character** of Particles

  (hydrophobic)

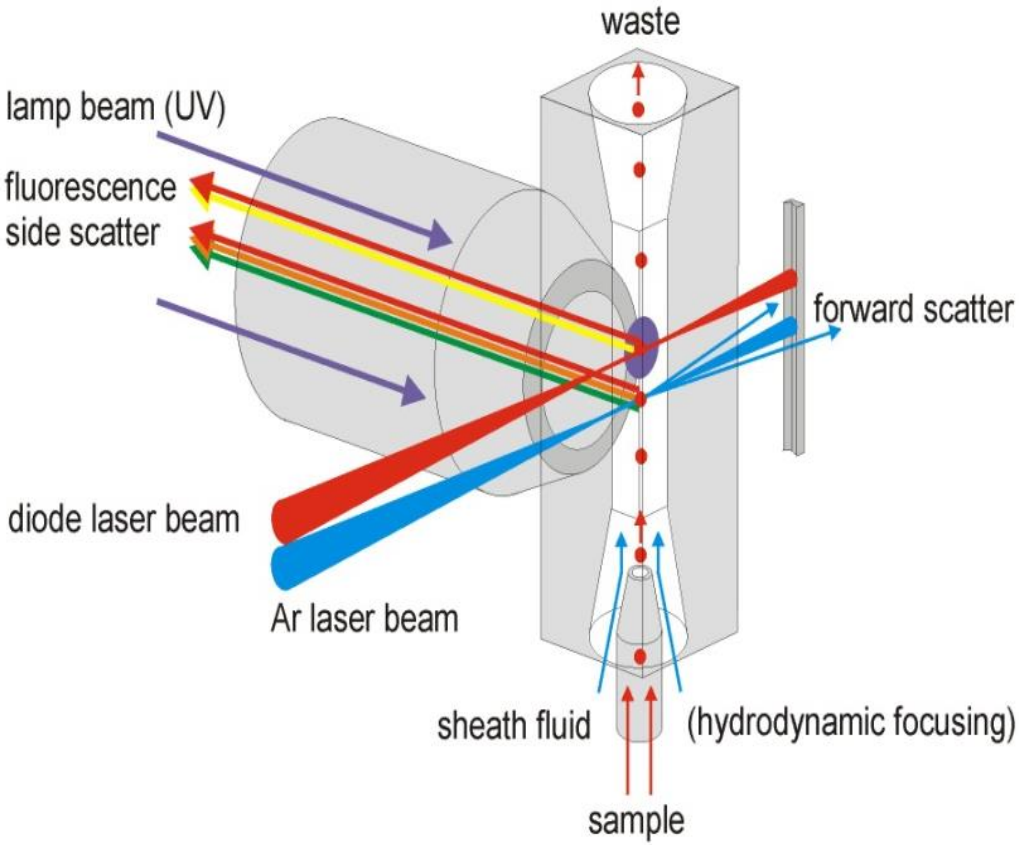
NopcoFlowCount



Fluorescens Microscopic image

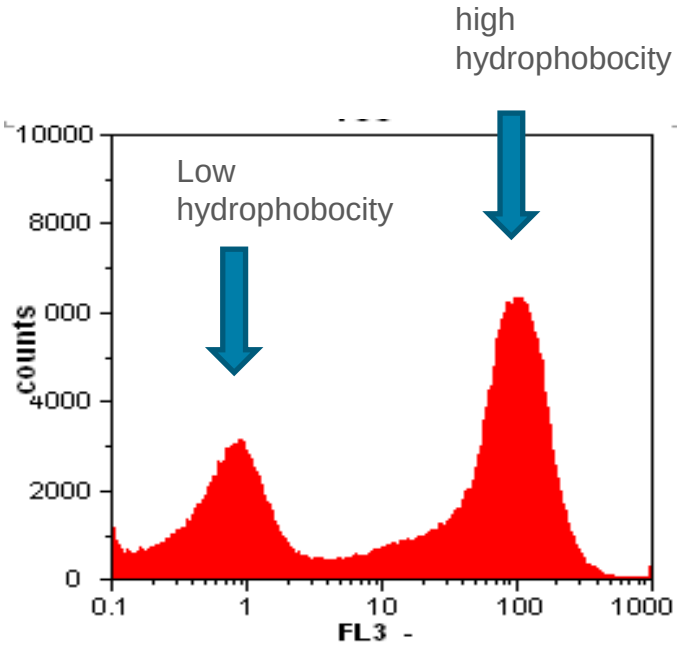
Flow Cytometry:
Analyses of particles with laser beam

Advantages:
High count rate
Statistical evaluation possible
Determine character of particles
Determine surface properties of particles



NopcoFlowCount

Nopco FlowCount measures the **number** of all particles and their **hydrophobicity** which indicates the sticky potential.

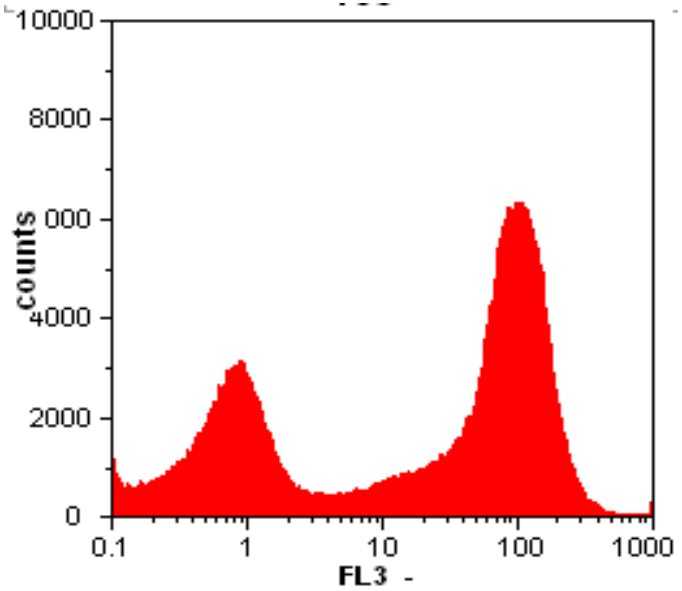


Y- axis: Counts = number of particles
X- axis: FL3 = Hydrophobicity

Target is to reduce the right peak = number of hydrophobic particles

NopcoFlowCount

Nopco Definition of Microstickies



Only particles **<50 µm** are measured

FL3<10: low hydrophobic = no sticky – potential

FL3>10: high hydrophobic = micro - sticky - potential

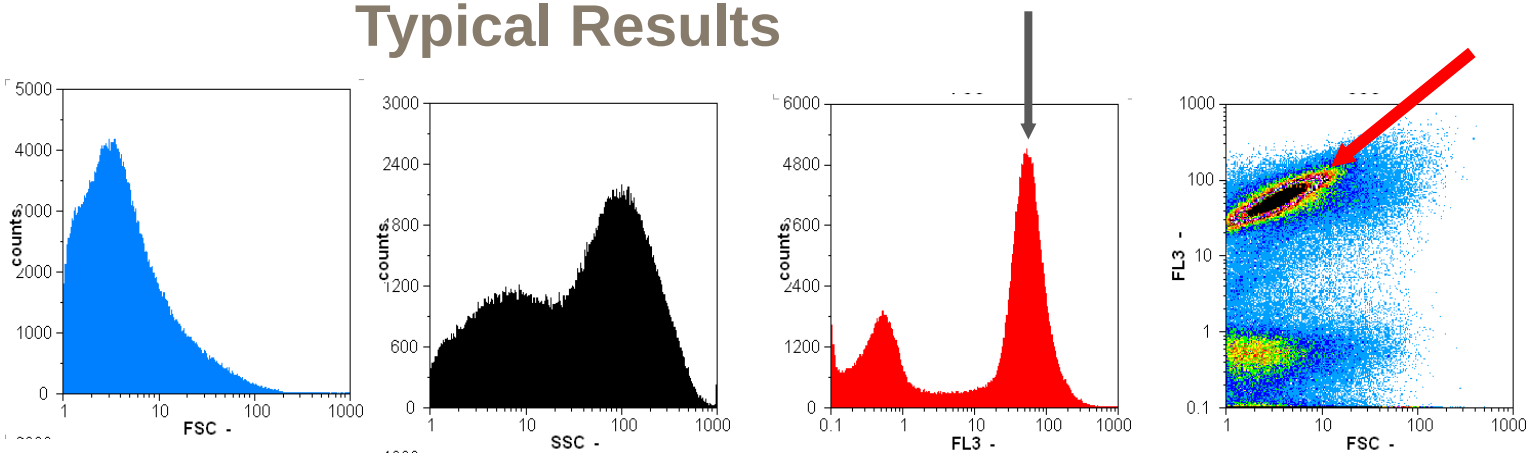
Definition Micro – Sticky:

<50 µm und FL3 > 10

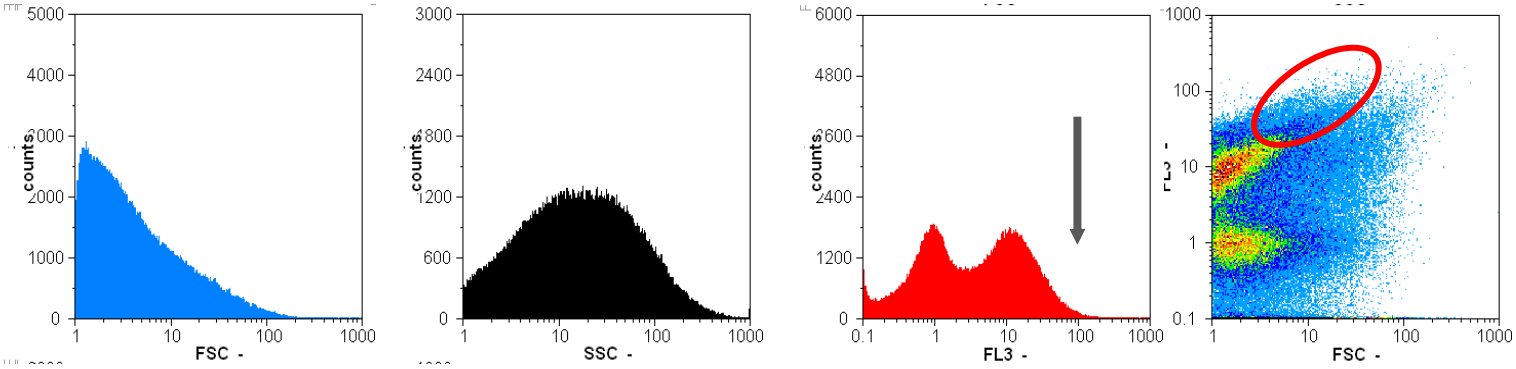
NopcoFlowCount

Typical Results

Without Treatment



With Treatment



CASE STUDY 1

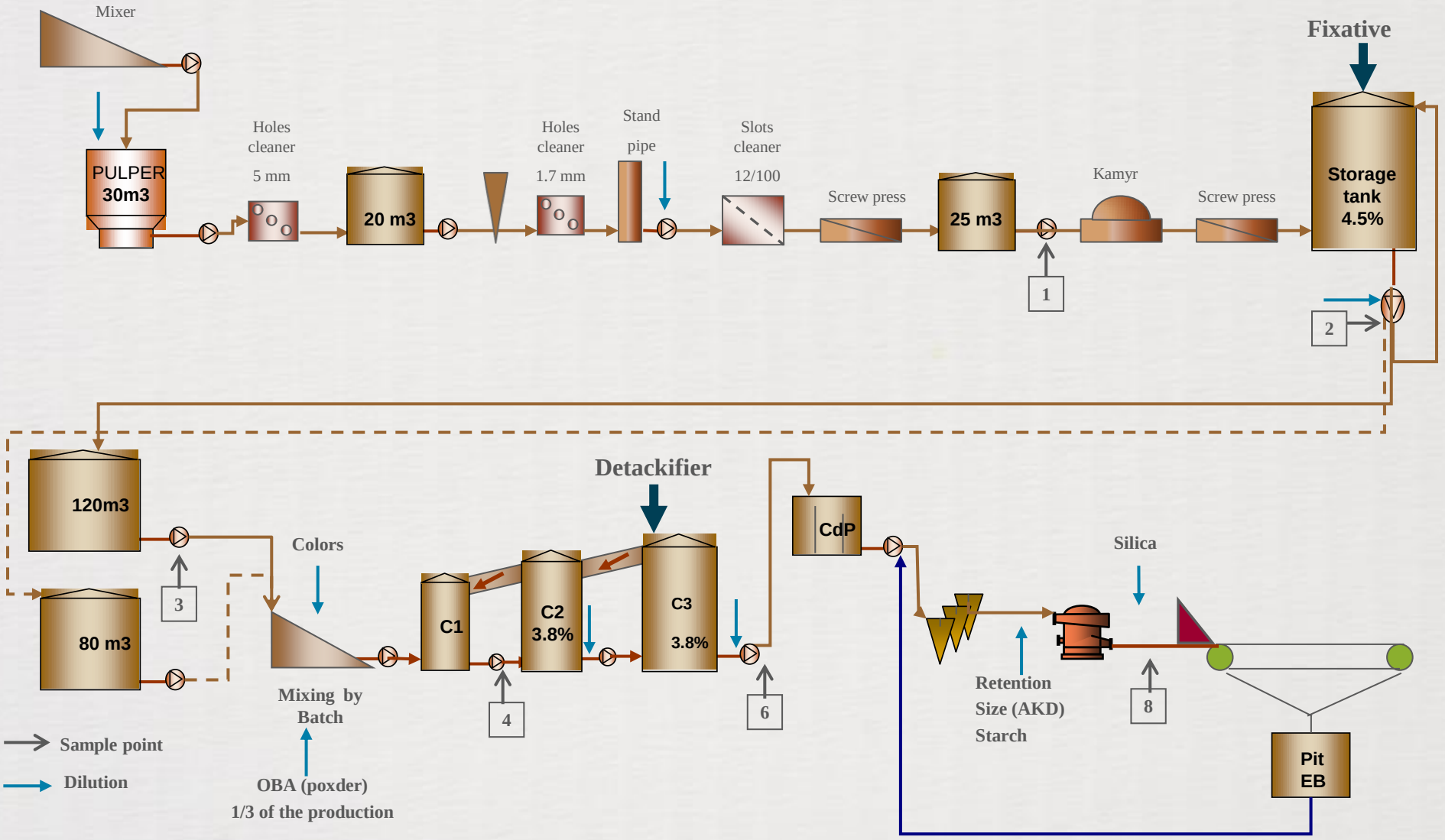
Paper Mill 1
Europa, PM 1

Paper Grade:	printing/writing, paper, colored/uncolored
Grammage:	60 – 250 g/m2
Furnish:	RCF 100%
Speed:	200 – 550 m/min
Production:	250.000 tpa
pH:	ca. 7

Situation before NopcoTreatment

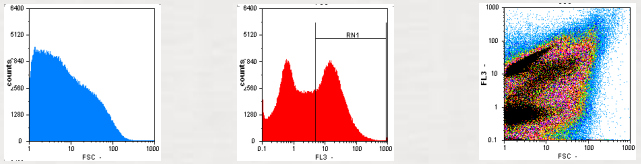
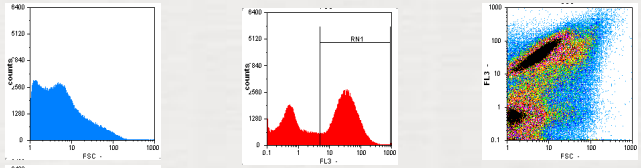
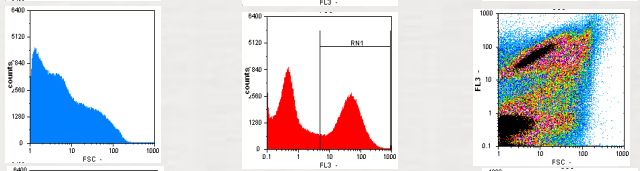
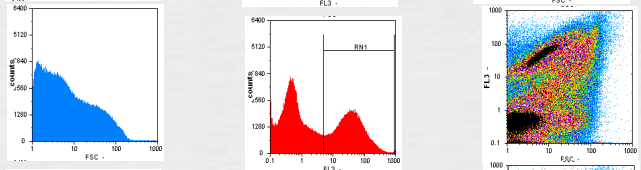
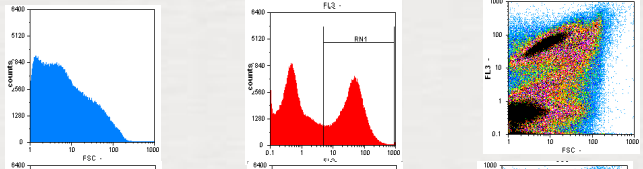
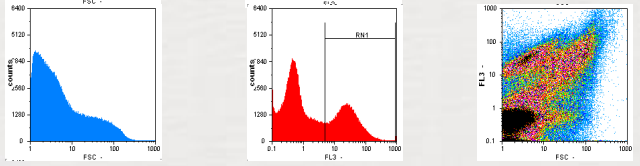
- Two component system to treat stickies.
- Treatment costs too high
- Holes and spots in paper due to sticky deposits

CASE STUDY 1 – FLOW SHEET

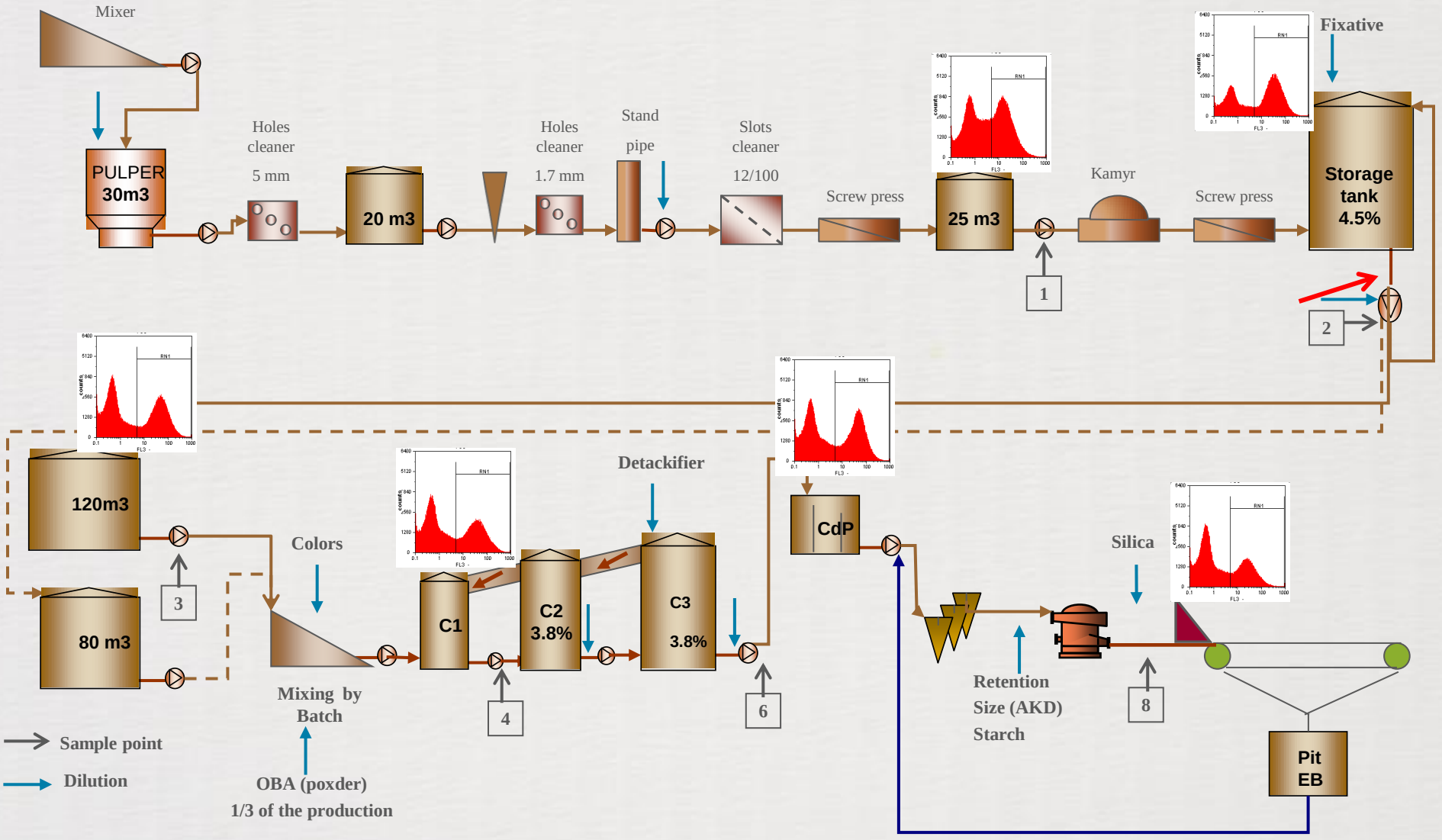


CASE STUDY 1 – SYSTEM AUDIT

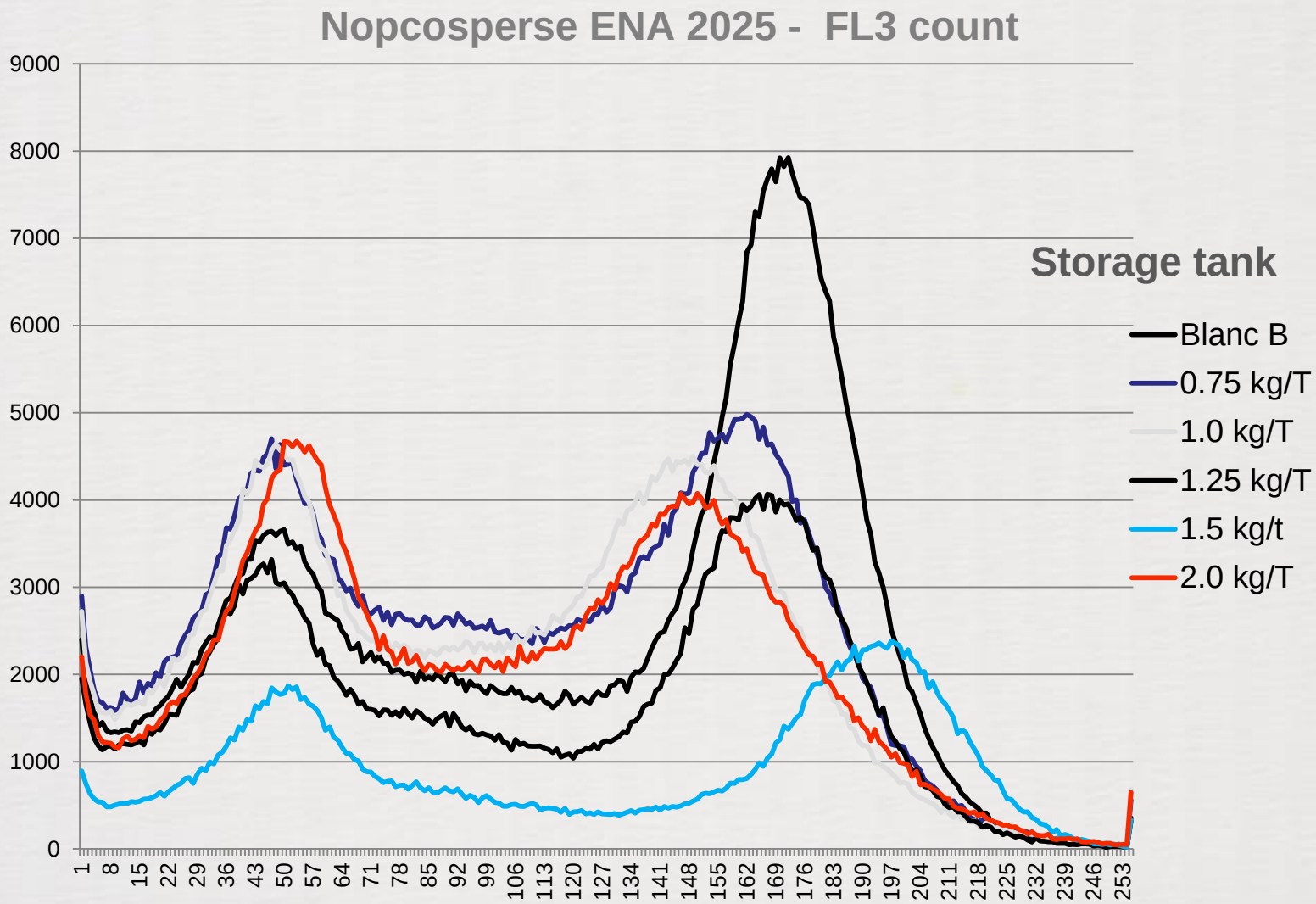
nopco

25 m3 Tank		547 563 228 902
Storage Tank		302 255 155 904
120 m3 Tank		447 173 161 427
C 1 Tank		424 428 148 602
C 2 CdP		495 023 188 223
Headbox		387 713 115 420

CASE STUDY 1 – SYSTEM AUDIT



CASE STUDY 1 – LAB TEST



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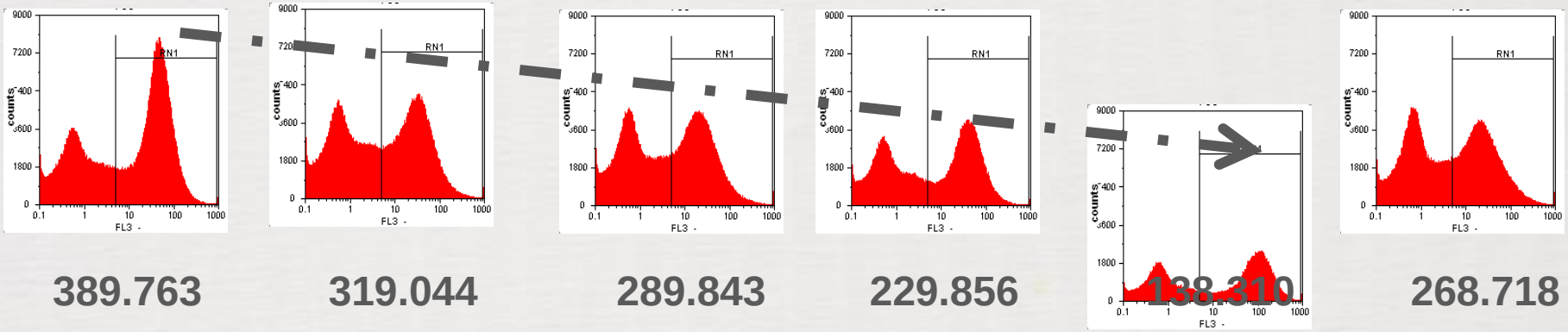
CASE STUDY 1 – LAB TEST

Nopcosperse ENA 2025 - FL3 count



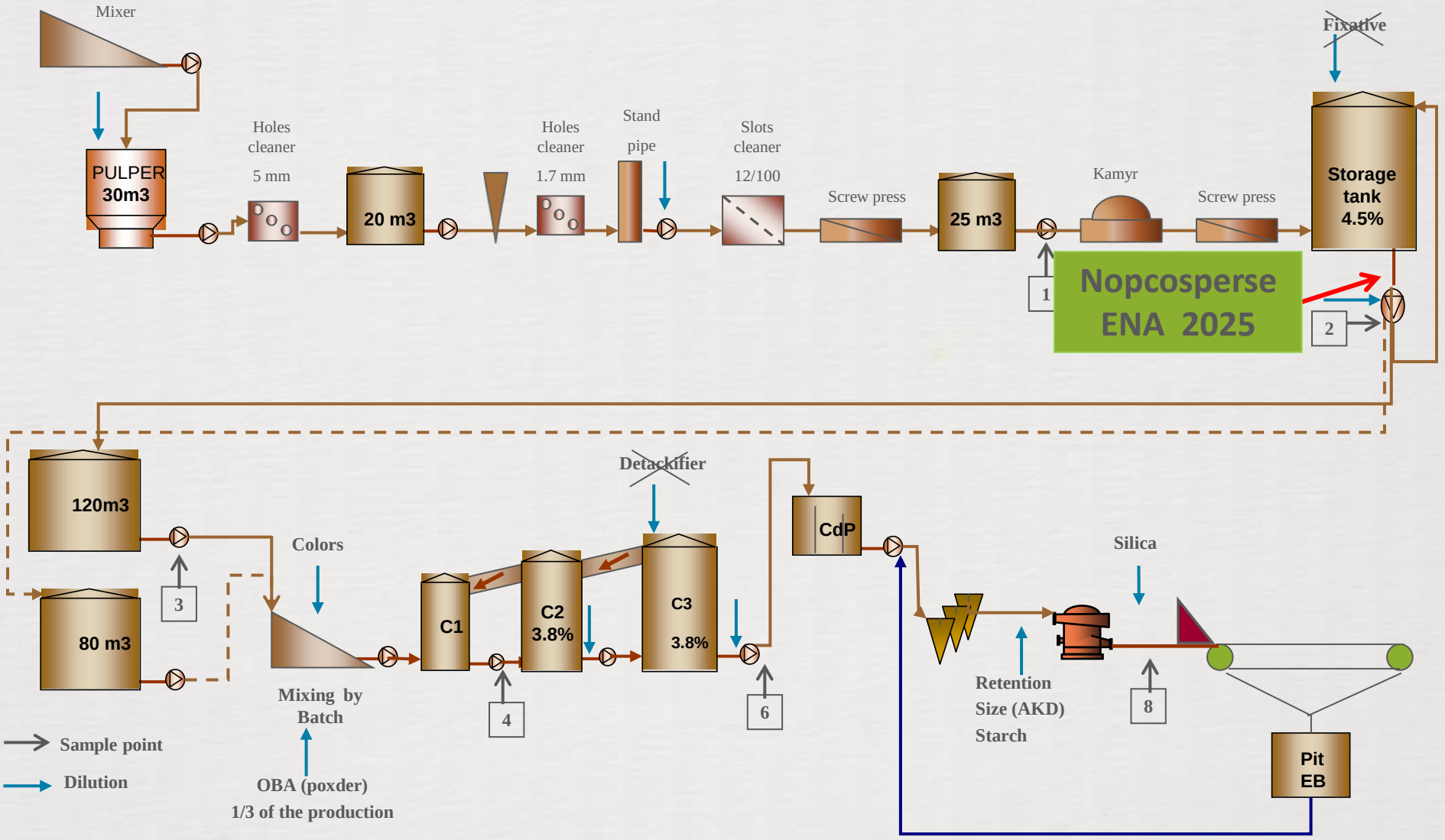
389.763	319.044	289.843	229.856	138.310	268.718
100%	- 19 %	- 26 %	- 42 %	- 65 %	
Blank	0,75 kg/t	1,0 kg/t	1,25 kg/t	1,5 kg/t	2,0 kg/t

Proposal:

Dosage point: → **Outlet storage tower**

Dosage amount: → **1,25 kg/ton**

TREATMENT 1 – FLOW SHEET



CASE STUDY 1

Results:

- Reduction of breaks by 35%
- Improved runnability since December last year
- Significant improvement at re-winder
- No sticky deposits in paper
- Easier handling (1 product instead of 2 products)
- Treatment costs reduced by 15%

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CASE STUDY 2

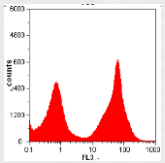
Paper Mill 2
Europa, PM 3

Paper Grade:	Duplex Board, Kraft liner, Testliner
Furnish:	RCF and kraft pulp
System pH:	ca. 7
System T:	ca. 45°C

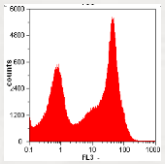
Situation before Nopco Treatment:

- High number of breaks and production losses due to black, sticky deposits e.g. on top roll
- Treatment costs above € 1,0/t
- No possibility to monitor the application
- No possibilities to improve the situation

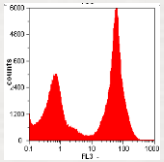
CASE STUDY 2 – SYSTEM AUDIT



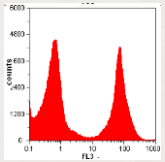
After storage tank Broke



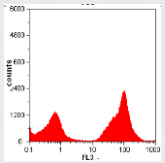
After storage tank RCF



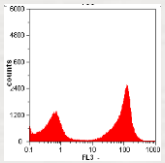
After storage tank plus kat. Polymer 1



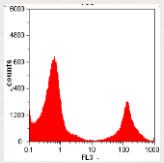
After storage tank RCF plus kat. Polymer 1 und 2



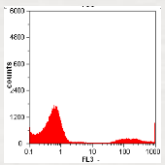
Dilution water from water treatment plant



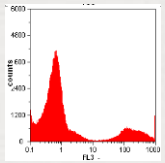
After storage tank kraft pulp



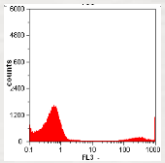
Mixing chest 10 min after dosage of kat. Polymer 2



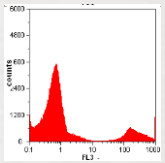
WW 1 top



WW 1 bottom



Head box top



Head box bottom

Results: **High count of microstickies in RCF and Broke. Dosage of the kationic polymers without any effect.**

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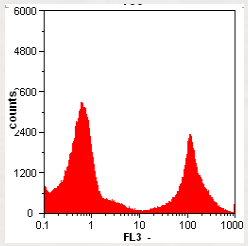
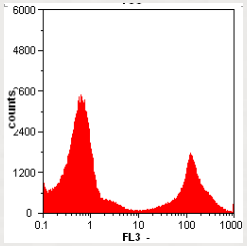
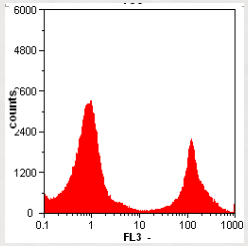
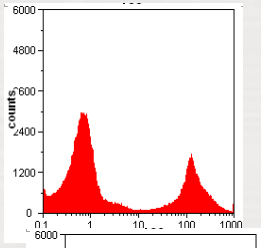
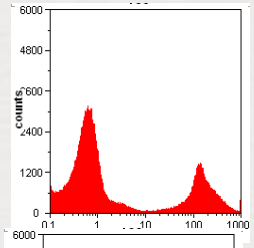
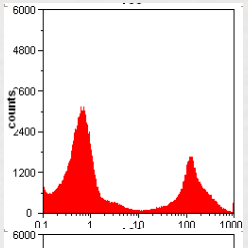
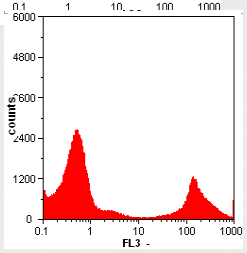
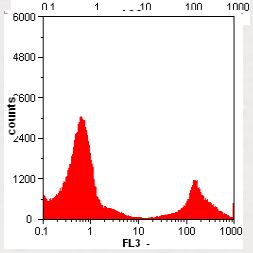
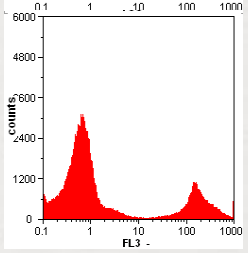
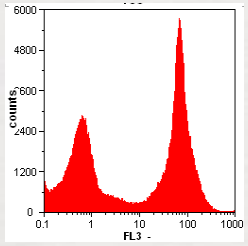
CASE STUDY 2 – LAB TEST

	N‘sperse ENA 4031	Nopco PT 289	Nopco PT 290
0.5 Kg/t paper			
0,75 Kg/t paper			
1.0 Kg/t paper			

Blank



Result: **Significant reduction of microstickies with all three products**

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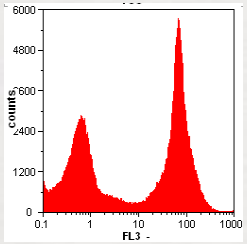
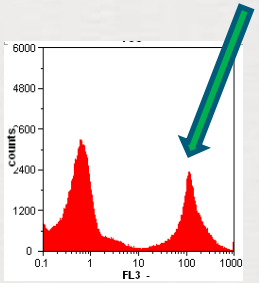
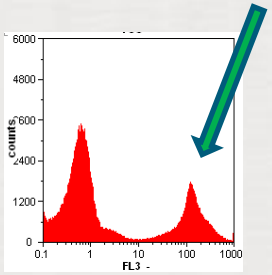
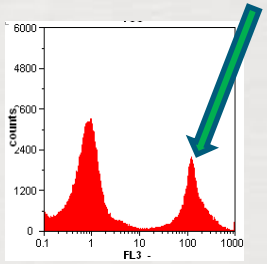
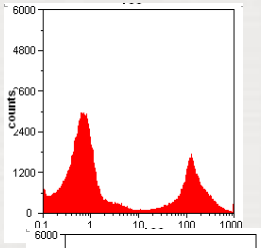
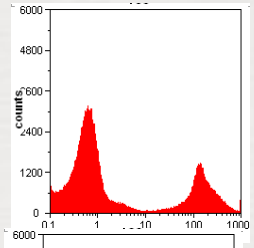
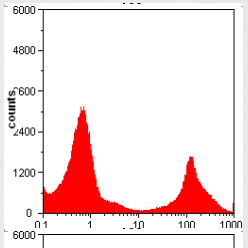
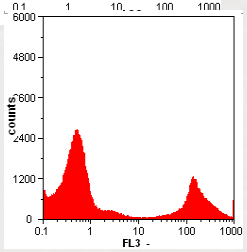
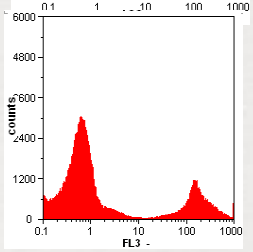
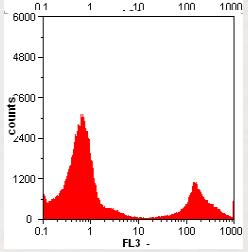
CASE STUDY 2 – SYSTEM AUDIT



	N‘sperse ENA 4031	Nopco PT 289	Nopco PT 290
0.5 Kg/t paper			
0,7 5Kg/t paper			
1.0 Kg/t paper			

Result:

Significant reduction of microstickies with all three products already with 500 g/t of dosage

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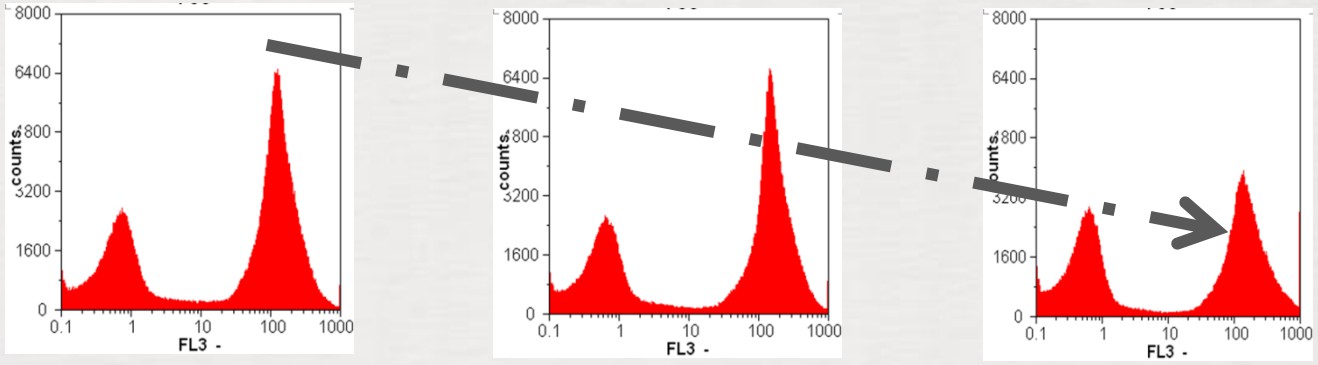
CASE STUDY 2 – LAB TEST

Comparison of Polymer 2 and Nopcofloc ENA 4031

Sample: →Storage tank RCF
Dosage: →400 g/t



Blank Polymer 2 **Nopcofloc ENA-4031**

CASE STUDY 2

Treatment

Product:	Nopcofloc ENA 4031
Dosage point:	Before mixing chest
Dosage amount:	0,4 kg/ton

Results

- Significant reduction of stickies in the system
- No sticky deposits on riding roll
- Number of breaks reduced by app. 90% already during the trial period of 8 weeks
- Treatment costs reduced by 15%

CASE STUDY 3

Paper Mill 3
Europe, PM 2

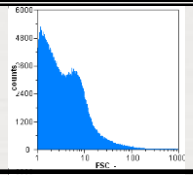
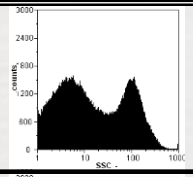
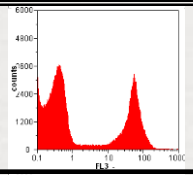
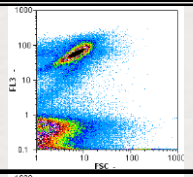
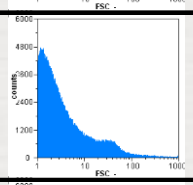
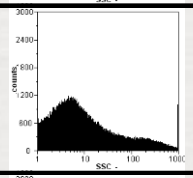
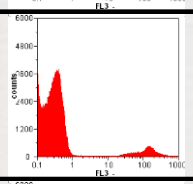
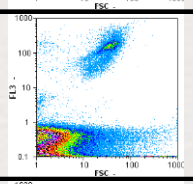
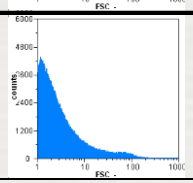
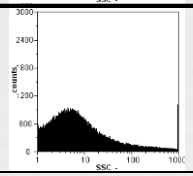
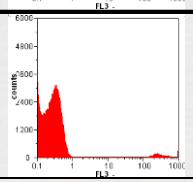
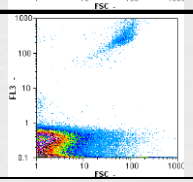
Paper Grade:	Improved Newsprint
Furnish:	DIP 80 – 100 %, TMP 0 – 20 %
System pH:	ca. 7
System T:	40-45°C

Situation before Nopco Treatment

- Black, sticky deposits on doctor blades
- Sticky deposits in paper
- High rate of customer complains

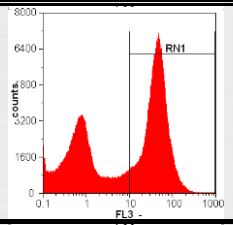
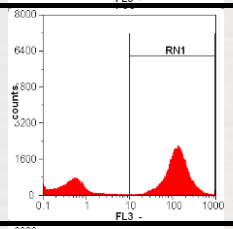
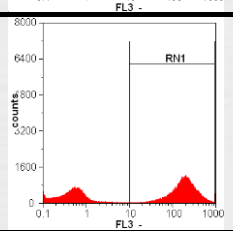
CASE STUDY 3 – LAB TEST

First lab test with PT 285

Sample	FSC – count Partikelgröße	SSC – count Oberflächen-struktur	FL3 – count Hydrophobie	FSC – FL3 Größe vs. Hydrophobie
Blank				
0,5 kg/t Nopco PT 285				
1,0 kg/t Nopco PT 285				

CASE STUDY 3 – LAB TEST

Second Lab test with PT 285

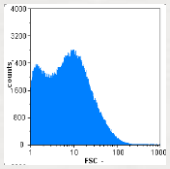
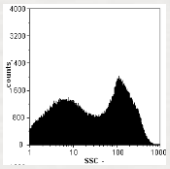
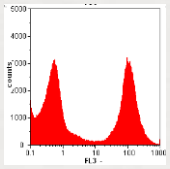
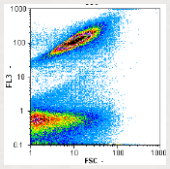
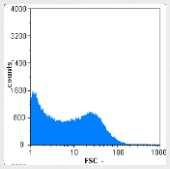
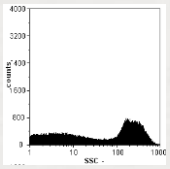
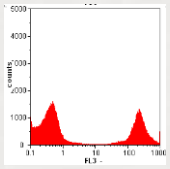
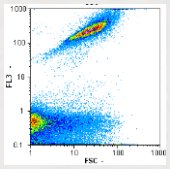
Sample	Hydrophobicity	Count	Reduction
Blank		247.366	
0,5 kg/t Nopco PT 285		83.430	**66%**
0,8 kg/t Nopco PT 285		51.308	**79%**

CASE STUDY 3

Treatment:

Product:	Nopco PT 285
Dosage amount:	0,8 kg/t
Dosage point:	Inlet of DIP storage tower

NFC results during machine trial

Sample	FSC – count Partikelgröße	SSC – count Oberflächen-struktur	FL3 – count Hydrophobie	FSC – FL3 Größe vs. Hydrophobie
Before dosage				
After dosage				

CASE STUDY 3

Results

- Reduction of deposits on doctor blades > 50%
- Significant reduction of stickies in final paper
- Significant reduction of customer complains

SUMMARY

- **Nopco Flow Count** has been in use for more than three years under practical condition
- Measurements are reproducable
- **NopcoFlowCount** is applied to:
  - determine sticky potential in paper machines
  - test performance of sticky control aids in the lab
  - monitor application
- **NopcoFlowCount** is also used to determine sticky potential in deinking units
- **Nopco sticky control** agents can successfully be applied at all paper grades