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IPPTA

**53rd ANNUAL GENERAL MEETING
AND SEMINAR 2017**

March 3rd - 4th, 2017, Savera Hotel , Chennai



“ Green and Clean Best Practices
and Technologies in Paper Manufacturing ”

Nurturing Nature

STICKIES AND PITCH CONTROL WITH SUPERIOR ENZYMATIC FORMULATIONS

Chris Rozett

Tajinder Bir Singh Chahal

- Introduction
- Stickies Problem
- Solution of Problem
- The Road to solve the Stickies Problem
- Case History
- Conclusion / Take always!

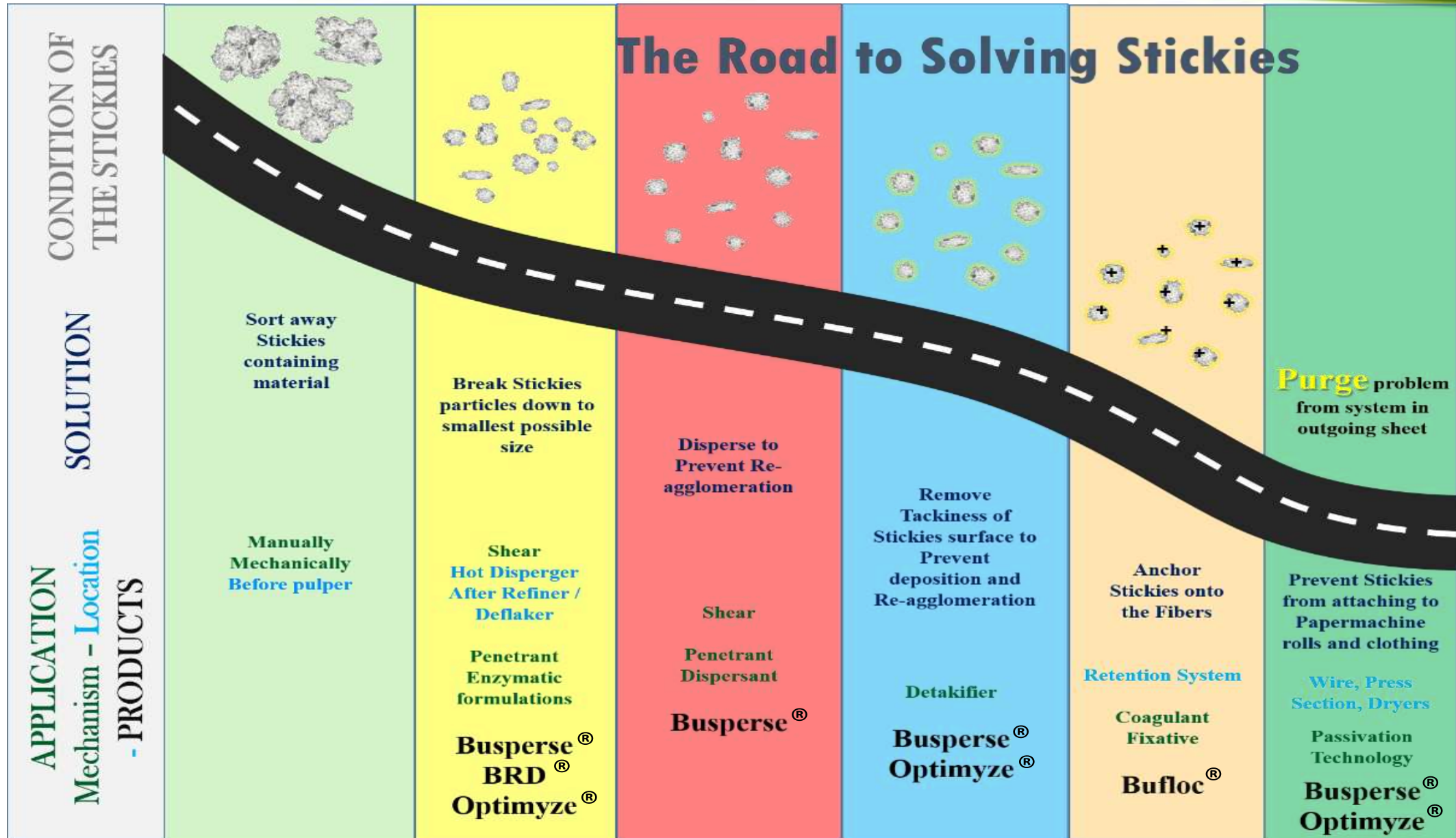
The STICKIES Problem

- As any papermaker using recycled fibers knows all too well (De-Inking and Brown)
 - Recycled fibers are ripe with STICKIES coming from glues and coatings
 - Virgin fibers contribute to the problem with tacky natural wood pitch
- ❖ Stickies are:
 - Tacky
 - Hydrophobic
 - Pliable Organic materials with a broad range of melting points and different degrees of tackiness depending upon the specific composition of the stickies
- ❖ That cause all sorts of problems for the papermaker

- All sorts of papermaking mayhem:
 - Reduced quality from spots or holes in the paper or board
 - Increased downtime from
 - Sheet breaks
 - Constant cleaning/changing of dryer doctor blades
 - Cleaning of dryer fabrics
 - Also causes problems in the converting process
 - Quality issues
 - Runnability issues

- The key to solving this nagging problem is to understand the chemistry involved and the right combination of chemistries to free the paper and board mills from stickies once and for all.
- The road to finally controlling the problem of stickies is paved with a host of exciting technologies new and old.
- No surprise that enzymatic formulations will lead the way to solve this problem, as they
 - Are very fast reacting biocatalyst proteins
 - Are extremely specific so as to only interact with the targeted ester bonds of the stickies
 - Offer significant ROI

The Road to Solving STICKIES

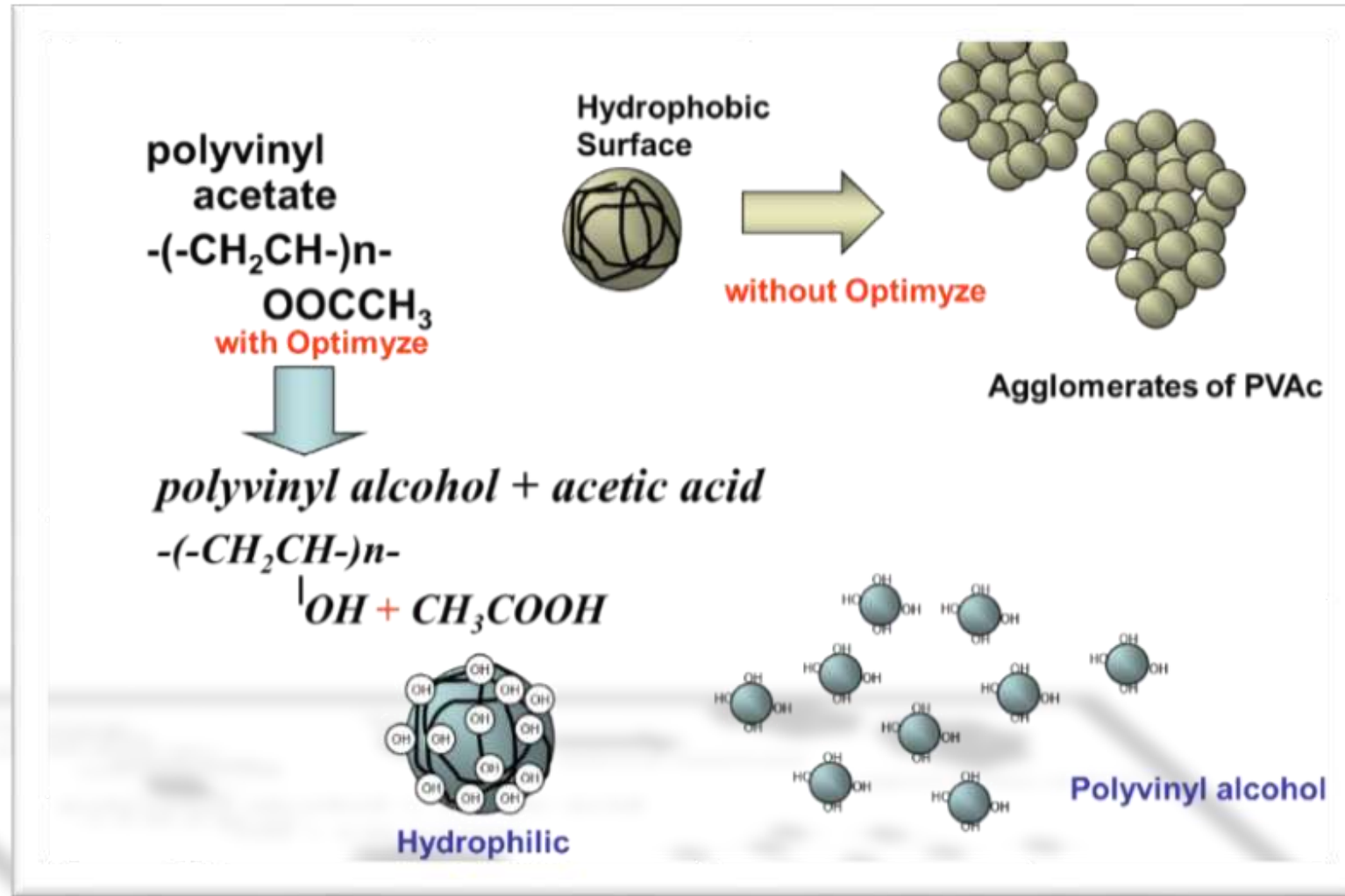


1. The first chemical action on the road to solving stickies is to break them down into smaller (hopefully non-visible) globules
 - The **Patented Optimize[®] Plus 727** is a specifically designed enzymatic formulation aimed towards satisfying the unique requirements of each mill stickies scenario.
2. Then the rest of the road focuses on keeping the **Stickies Dispersed** and **Non-tacky**
 - Dispersants, Surfactants, Detackifiers, Adsorbents...
3. and finally retained in the sheet to be purged (via the paper) from the paper machine system
 - Flocculants, Coagulants, Microparticles, Micropolymers...

- The **Optimize[®] Plus 727** formulation takes care of this problem in two ways:
 1. Cleaves **Ester Bonds** to reduce the size of the stickies
 2. **Converts The Surfaces Of The Stickies And Pitch Into Alcohol Groups** to make them less tacky



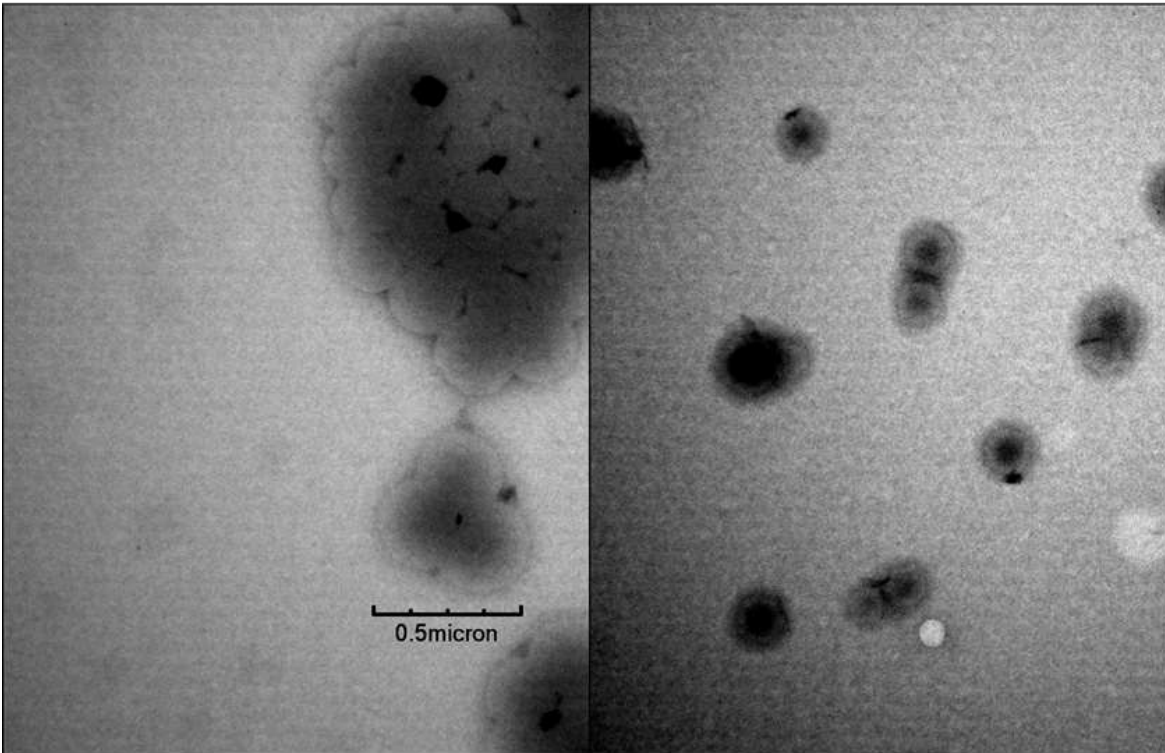
The Enzymatic Reaction



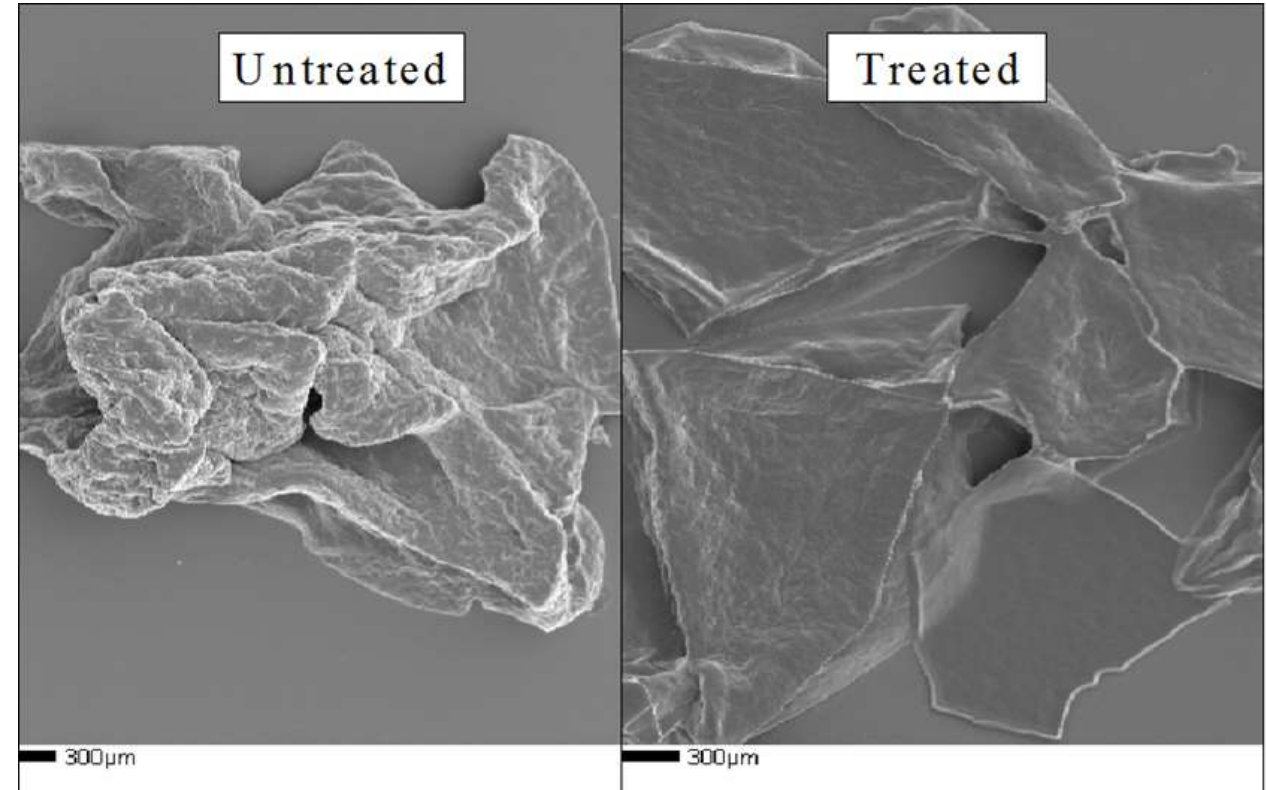
Cutting Down the Problem

Stickies Samples Untreated

Stickies Sample Treated with Optimize

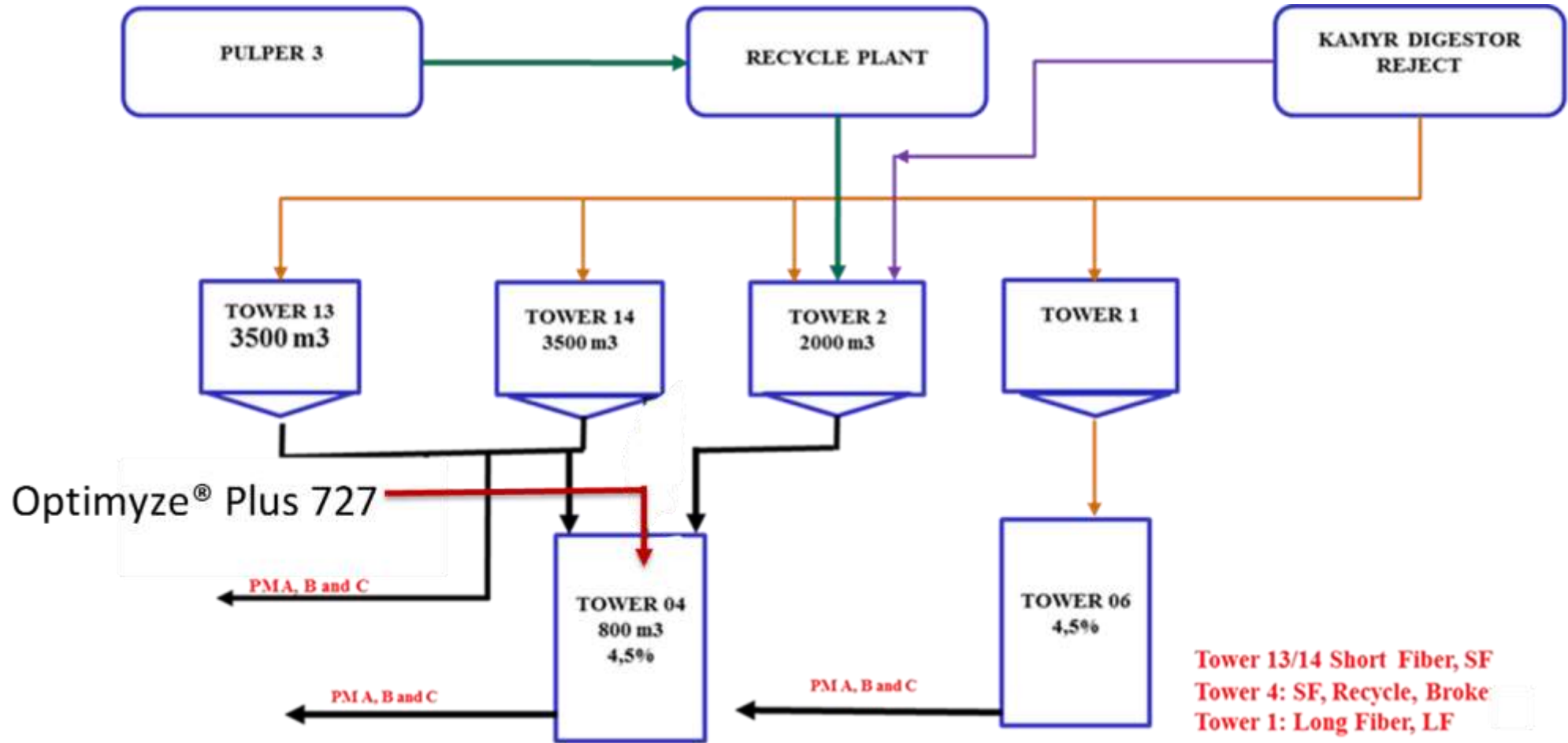


Smoothing Out the Surfaces



- Less tacky means less likely to stick to surfaces
 - less downtime
- Alcohol groups are also polar, which allows for better
 - polymer fixation (retention) in the sheet or
 - removal in DAFs (flotation) and washing
- and it further prevents agglomeration of any hydrophobic particles

STICKIES Case Study Process

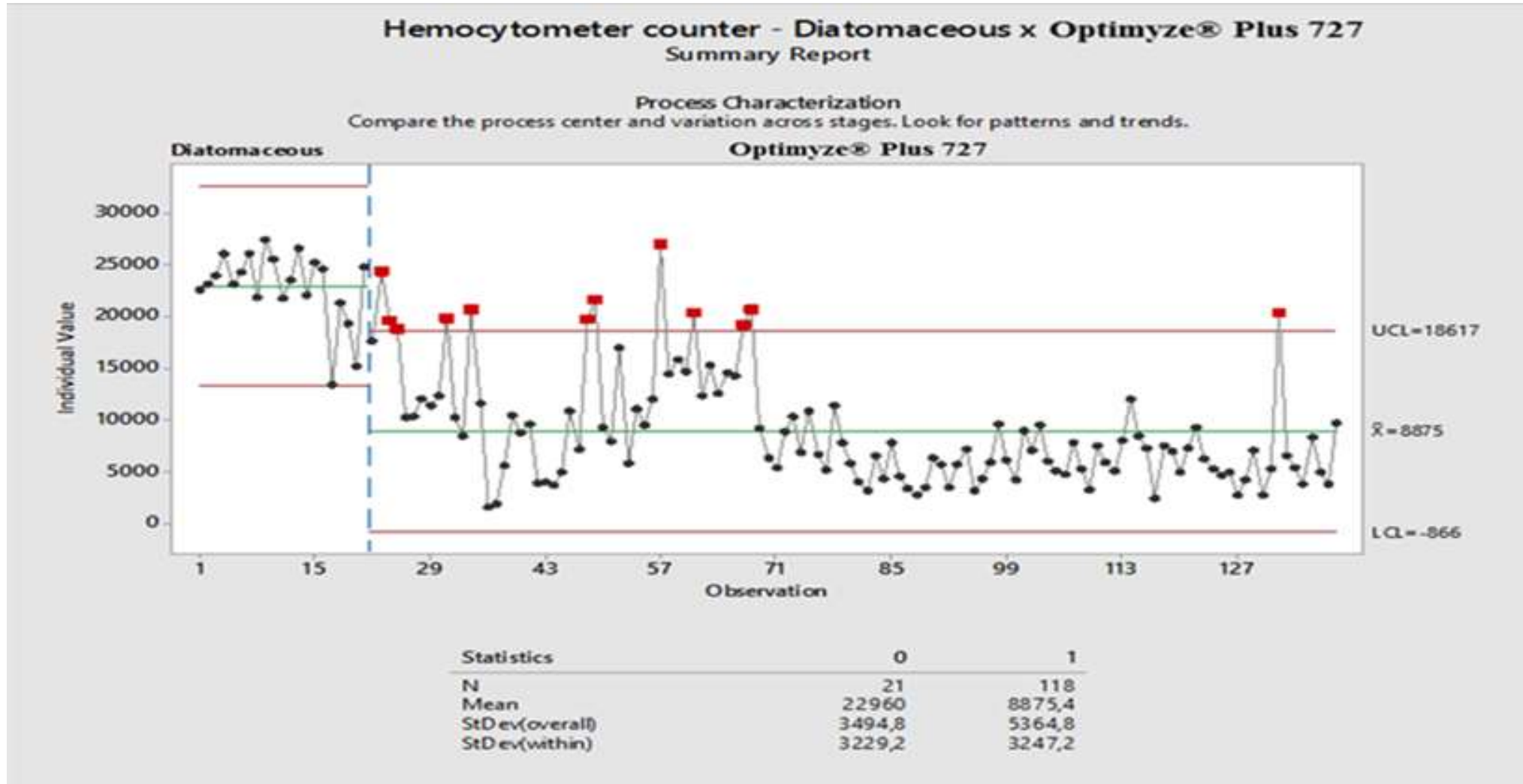


STICKIES Case Study Data

Paper machine:	
Grade	Kraft liner (recycled content)
Furnish	60% mix of SF + recycle (variation of 20-80% from each) and 40% mix 75% SF + 25% LF
Former	Fourdrinier with top former
Production rate	1372 tpd
Application point pH	9.2
Headbox pH	6.3
Headbox temperature	50°C
Additives:	
Diatomaceous earth	2.0 kg/ton, to stock tower ← Replaced
Coagulant cationic	1.7kg/ton, blend chest outlet
Cationic starch	4.5 kg/ton, blend chest inlet
PAC	2.0 kg/ton, fan pump suction
Rosin emulsified size	2.0 kg/ton, before screen
Silica	4.0 kg/ton, after screen
Alum	9.0 kg/ton, white water
MB control (Busperse 2454)	0.6 kg/ton, water system
Optimize® Plus 727	0.4 kg/ton, to stock tower (tower 4 inlet) ← Added

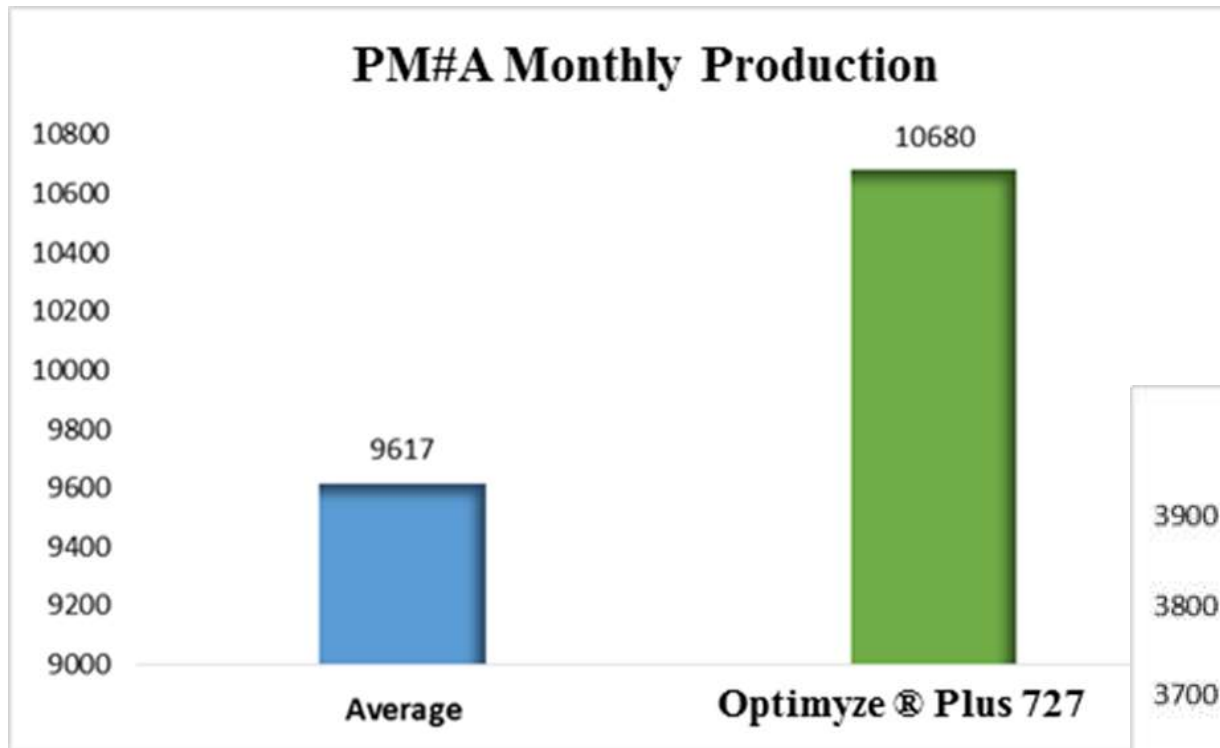
Reducing the Stickies

- Reduced Hemocytometer Measurements by 61.3%

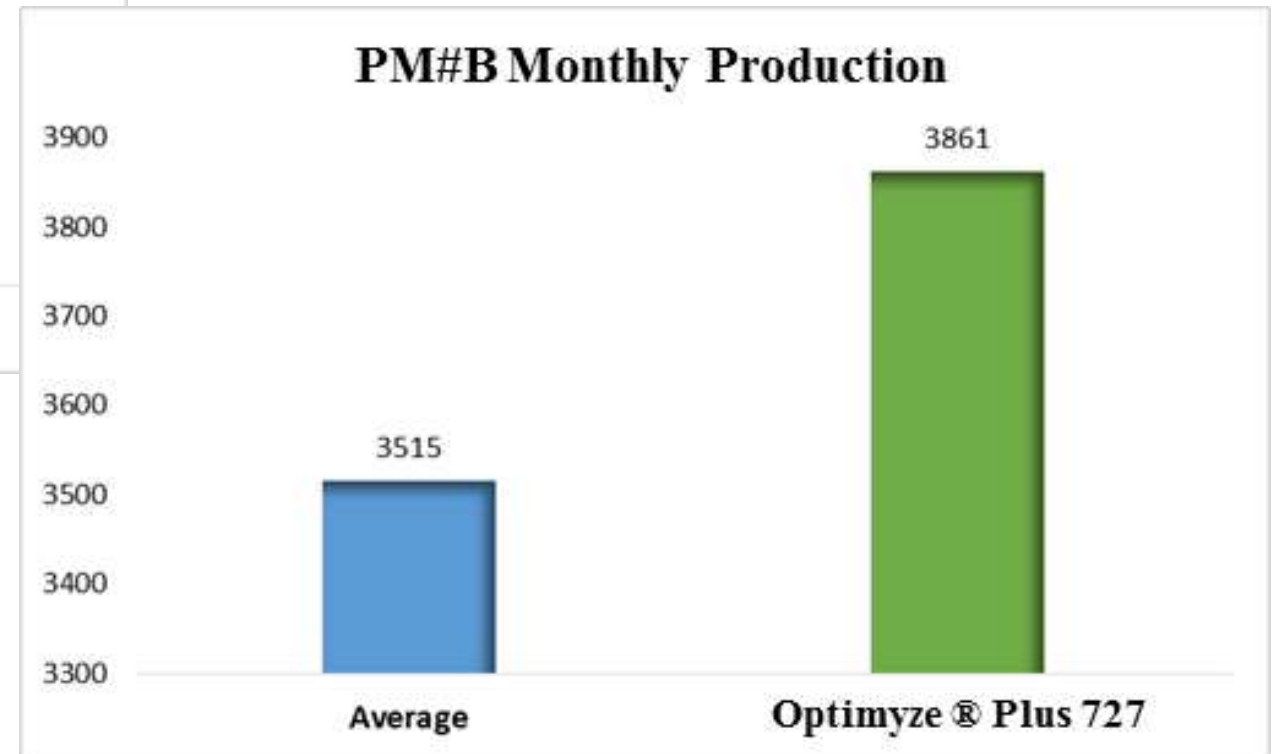


- Reduced hemocytometer measurements by 61.3% indicates
 - A cleaner system
 - Fewer agglomerates large enough to be picked up by the instrument
 - Less likelihood of being perceived in the sheet
 - Less likelihood to come out at dryers and dryer clothing (felts, screens)
 - Less downtime for cleaning
 - Higher production rates

Increased Production



- lead to an 11% increase in production



- The savings and cost avoidance always returns a great ROI from the cost of the enzymatic formulation used in this treatment
- The following are several of the key areas that were considered when calculating the potential ROI in this paper mill case study being reviewed here
 - ✓ Improved Machine Efficiency → **Fewer Breaks**
 - ✓ Improved Sheet Quality → **Fewer Holes/Picking**
 - ✓ Reduced Wash-up Time → **Less Downtime**
 - ✓ Reduction in Overall Chemical Treatment Spend → **Less Cost**
 - ✓ Eliminated Chemical Makedown → **Less Cost**

ROI = Stickies Solved

RETURN ON INVESTMENT CALCULATION			
item	Diatomaceous cost (\$/month)	Increased production after Optimize® Plus 727 (\$/month)	Optimize® Plus 727 cost (\$/month)
PM#A	29,789.62	12,533.12	17,429.76
PM#B	10,888.06	4,047.36	6,301.15
PM#C	85,936.72	0.00	45,276.58
TOTAL	126,614.40	16,580.48	69,007.49
ROI \$/month	74,187		
ROI \$/year	890,249		

Conclusions

- The road to solving STICKIES is by making them very small, non-tacky, and purging them from the paper machine system in the outgoing sheet of paper or board
- Optimize[®] Plus 727 (specifically designed enzymatic formulation) solves this problem by cutting down the size of the STICKIES and rendering them non-tacky
- Reviewed a case study where Optimize[®] Plus 727 replaced diatomaceous earth gave huge benefits:
 - ✓ 61% reduction in STICKIES count (Hemocytometer)
 - ✓ 11% increased production
 - ✓ \$890,000 per year in ROI
- 53 similar successful applications of this type of formulation worldwide, and many other similar yet uniquely different formulations have been equally successful all over the world and are ready to help solve your stickies dilemma

