

Development of Noble Chemicals for Stickies Control and Bulk Improvement

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This paper is related to the effect of two different type of chemicals developed : Stickies Control to ease out the stickies problem in waste paper furnish, and Superbulk to improve bulk of the paper produced by using various type of pulps without disturbing other strength properties of end product. The physical properties of paper produced after laboratory study and mill trial are presented. The improvement obtained by using these two chemicals, are discussed.

INTRODUCTION

Stickies Control : Stickies are a trouble-some type of impurity found in the pulp made out of various grades of waste paper. Stickies are broad class of deposits that contain synthetic contaminant which are converted into small pieces during pulping operation of waste paper. Hotmelt, Contact Adhesive and Xerographic inks comprise of the 3 major sources of stickies. Stickies are generally classified in two categories Macro (>100 micron) and Micro (< 100 micron). Stickies cause various problems viz. roughness, holes, specks in the paper produced and also causes poor machine runability, calender breaks, press picking, felt and screen choking etc. In spite of mechanical screening and washing, Stickies escape from the system and end upon the Machine Wire and Felt, Press, Dryer, and Machine Calendars causing machine down time and downgraded product. To achieve effective control of stickies, a specialty water dispersible chemical, blended with catalyst has been developed to prevent agglomeration and help out in selectively detaching the sticky substance, that are an integral part of waste paper furnish.

Superbulk : Superbulk increases bulk of Tissue Paper, Paper & Board by raising specific volume of the fibre.

The increase in volume is basically independent of the furnish used . It is particularly more advantages when secondary fibre are used. It also improves smoothness of Paper and board without affecting various other strength properties of Tissue Paper, Paper & Board.

EXPERIMENTAL

Stickies Control : The studies on SC-2001 (Stickies Control) carried out as stickies control agent for recycled fibre. The experiment were conducted on Waste Paper sample collected from a waste paper based mills having stickies problem using ONP/OMG furnish for newsprint production and also MOW furnish. Laboratory studies were also carried out at CPPRI including optimization of the dosage of SC-2001 with two different samples.

- a. Optimization of the dosage of SC-2001 with ONP/OMG furnish.
- b. Optimization of the dosage of SC-2001 with MOW.

The studies were conducted using Pulmac Master Screen for collection of stickies using 0.15 mm slot screen and quantified using Image analysis. Total Stickies count was calculated using TAPPI EBA method employing image analysis (Paprican Image Analyzer)

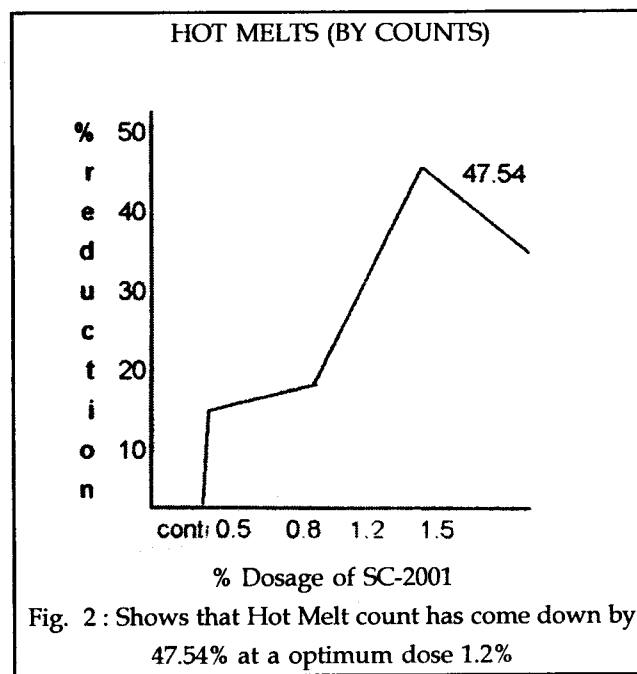
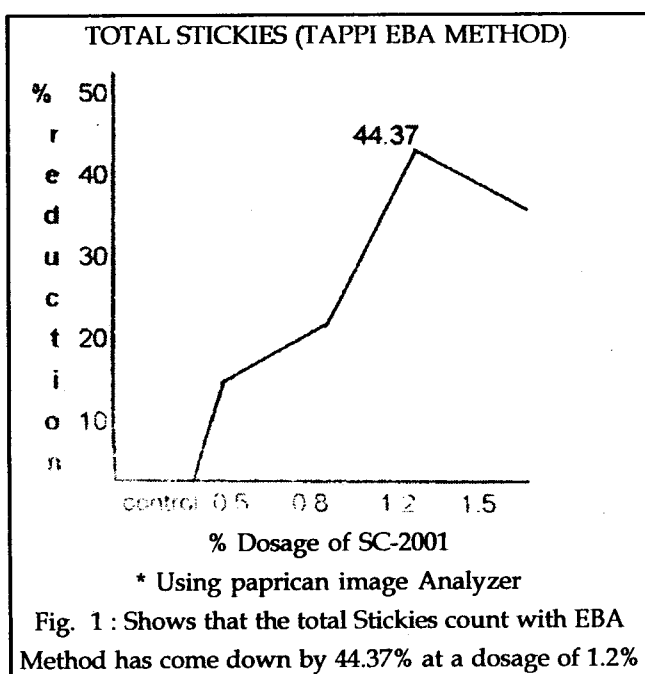
Table 1 : Optimization of Dosage of SC-2001 Using ONP/OMG Furnish for
Newsprint Production

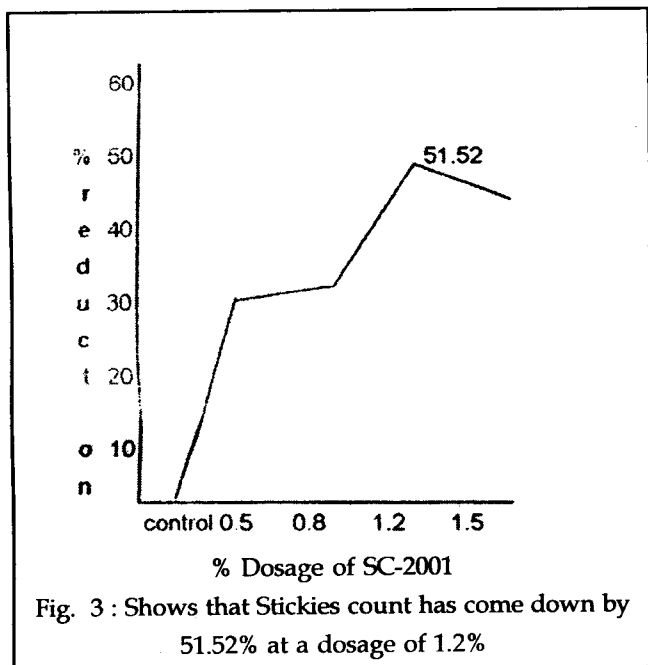
% Dosages of SC-2001						
		Control	0.5	0.8	1.2	1.5
Total Stickies (EBA Method)	Numbers	3020	2480	2460	1680	1880
	per Kg					
	% Reduction	0	17.88	18.54	44.37	37.75
Hot Melts (By counts)	Number	1220	1020	1000	640	800
	per Kg					
	% Reduction	0	16.39	18.03	47.54	34.43
Stickies (By counts)	Number	1650	1100	1080	800	883
	per Kg					
	% Reduction	0	33.33	34.55	51.52	46.67

Consistency of the Stock during Chemical addition - 4%

Table 1 Shows that SC-2001 in furnish of ONP/OMG for Newsprint production that total Stickies count (with EBA Method) has come down by 44.37% and Hot Melt by 47.54% Stickies by 51.52 at a optimum dose level of 1.2%.

GRAPHICAL PRESENTATION OF OPTIMIZATION USING ONP/OMG FURNISH





and stickies (Tacky at room temperature) were calculated manually. The results are summarized in table 1.

Optimization of the Dosage of SC-2001 using Mixed Office Waste (MOW)

The studies were conducted using Pulmac Master Screen for Collection of Stickies using 0.15 mm slot screen and quantified Using Image Analysis. Total Stickies Count was calculated using TAPPI EBA Method, employing Image analysis (Paprican Image Analyzer) and counts for Hot Melts (Tacky at high temperature) and stickies (Tacky at room temperature) were calculated manually. The results are summarized in Table 2.

Table 2 : Optimization of Dosage of SC-2001 Using Mixed Office Waste (MOW)

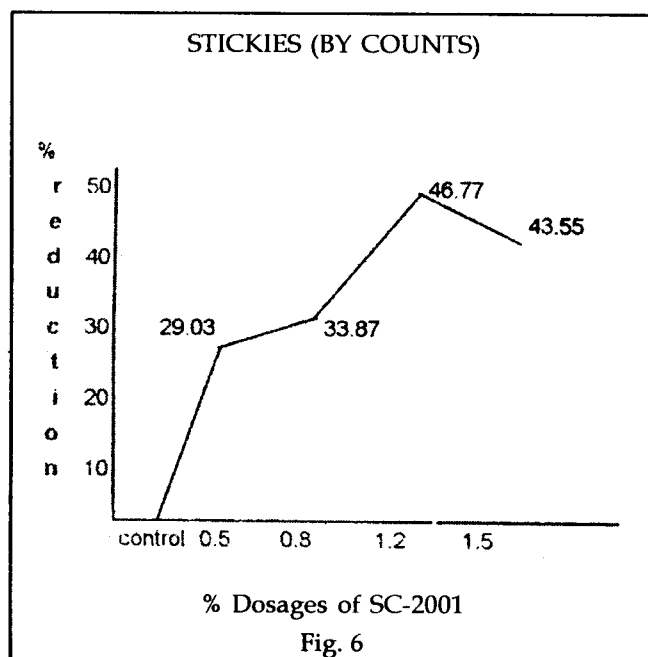
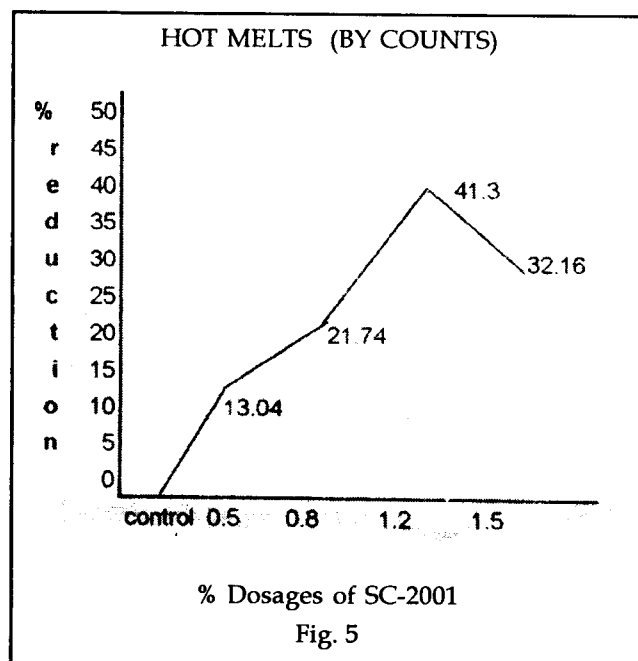
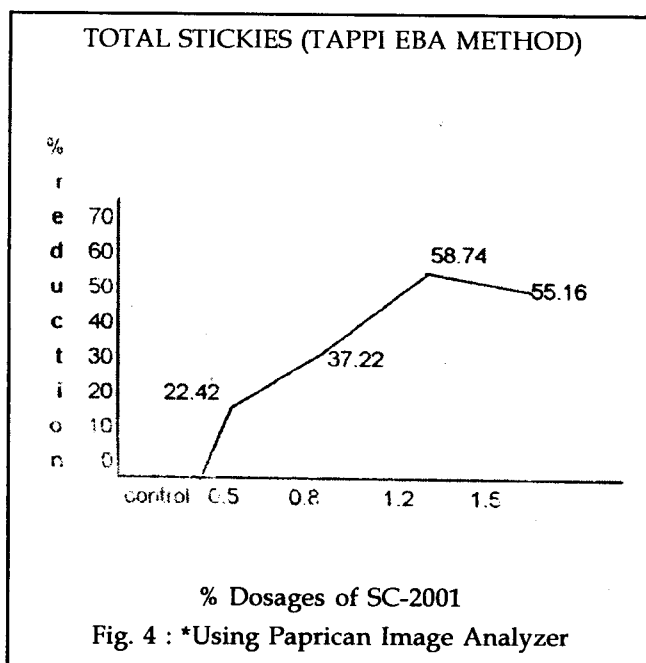
% Dosages of SC-2001						
		Control	0.5	0.8	1.2	1.5
Total Stickies (EBA Method)	Number	2230	1730	1400	920	1000
	per Kg					
	%	0	22.42	37.22	58.74	55.16
Hot Melts (By counts)	Reduction					
	Number	920	800	720	540	
	per Kg					
Stickies (By counts)	%	0	13.04	21.74	41.30	32.16
	Reduction					
	Number	1240	880	820	660	
Stickies (By counts)	per Kg					
	%	0	29.03	33.87	46.77	43.55
	Reduction					

Stock Consistency during Chemical Addition : 7%

It shows that dose by 1.2% reduces in total stickies (EBA Method) is 58.74%,

In case of Hot Melt, 41.30%, & in case of Stickies (by count) it is 46.77%.

GRAPHICAL PRESENTATION OF OPTIMIZATION OF SC-2001 USING MIXED OFFICE WASTE



The optimum dose of SC-2001 for this furnish is 1.2%, which may vary from case to case basis. The chemical is more effective for the removal of stickies which are tacky at room temperature and relatively less effective for hot melts which are tacky at higher temperature and forms blotches on finished paper leading to quality deterioration as well as paper breaks.

APPLICATION

Stickies Control

"CON-TROL" SC-2001 is in liquid form and is non-toxic.

- High consistency batch pulper with a heating Arrangement to attain 65 to 70 degree centigrade temperature.
- Retention at that temperature for minimum period of 30 minutes before the pulp is taken for further process.
- High Density Cleaner followed with Turbo Separator.
- Coarse screen followed by 2 stage fine screening of 0.25 mm 0.15 mm slot.
- De-inking, Dispersion (Hot or Cold) as available in case of News Print, Writing and Printing Plants.
- Thorough washing after screening in vertical compact washer/potcher/B2 thickener, gravity decker (List in the order of preference).

Once the pulp is processed as per the flow suggested above, a fair amount of stickies and waxes present in

GRAPHICAL PRESENTATION OF EFFECT OF SUPERBULK ON BULK OF PAPER

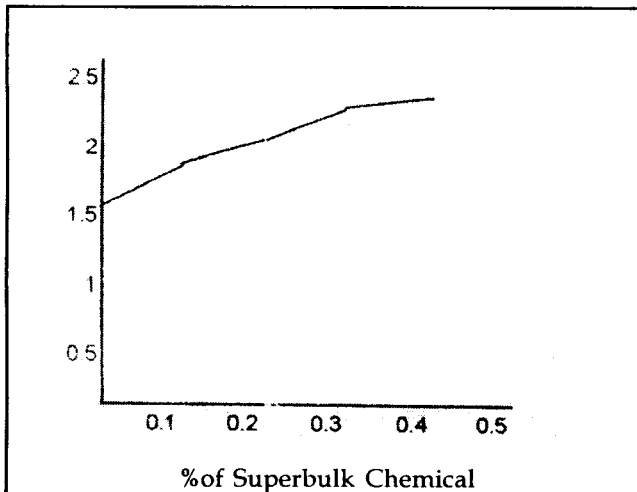


Fig. 7 : Effect of Superbulk Chemical

This figure indicates that at optimum dosage of Superbulk of 0.4% shows improvement in bulk, i.e., bulk from 1.5 micron to 2.3 micron.

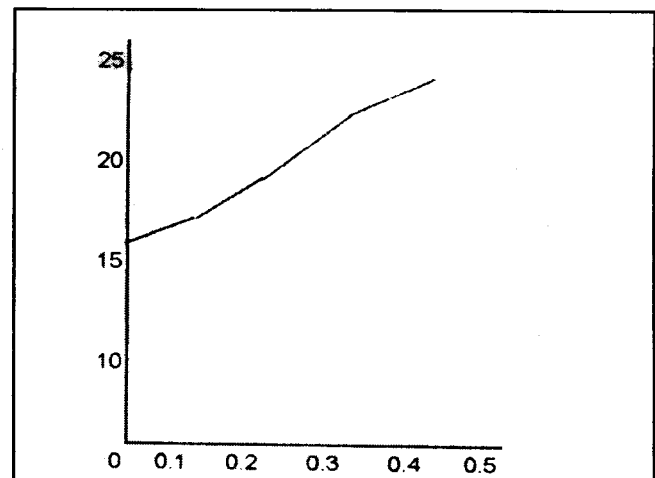


Fig. 8 : Porosity Gurley 200 ml

It shows with addition of superbulk, the smoothness at an optimum level of 0.4% has not got any negative impact.

the furnish, form agglomerates and are removed effectively in screening operations. The stickies escaped from the screening operations because of its small size are removed in the washing operation as rejects. Together this enumerates to be in the range of 40 to 50 percent of total stickies present in the furnish. Balance stickies which have remain in the pulp inspite of 0.15 mm slotted screening, do not develop tendencies to form agglomeration with further addition of this chemical will keep them in suspension in form of tiny particles. As a second stage operation subsequently small quantity of SC-2001, added to the final machine / mixing chest, will keep the balance contaminates in the form of micro stickies only and will be induced to remain in suspension uniformly dispersed in stock slurry. It has been observed that this micro stickies are carried forward in the paper web and some parts which tend to adhere to the dryer surface, are removed in the form of dry powder, collected on the Doctors Blades of the Dryers. It was also observed that after using this chemical the slime colonies tend to break into minor particle and do not contribute to wet end break. Thus eliminates/reduces usages of Slimicides.

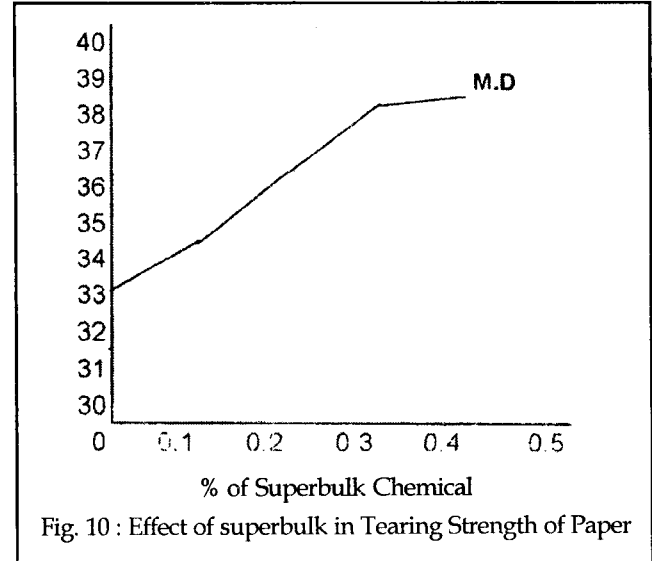
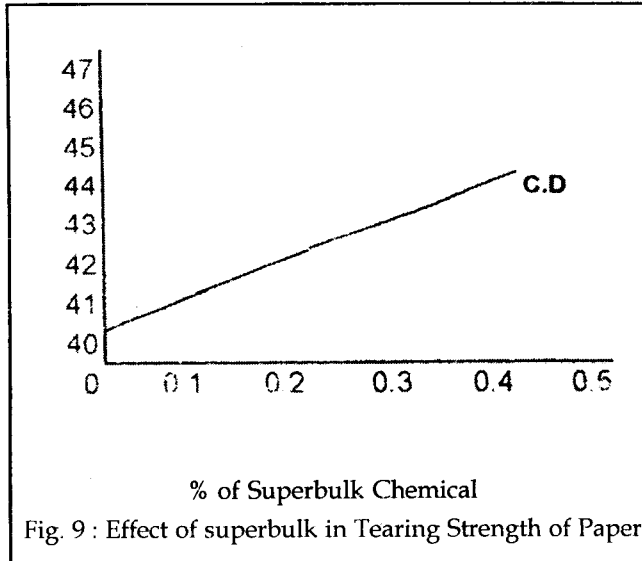
Superbulk :

"CON-TROL" Superbulk is white liquid emulsion. It may be used as such or in dilute form (0.1 to 0.3%) in the mixing chest or near the head box before the fan pump, optimum dose of the chemical ranges between 2 to 6 kg per tonne of pulp. However dosage may very depending upon the desired level of bulk and the type of furnish used. Based on the several in house Lab evaluation the plant trial was carried out in a Paper Mill. After using this chemical at the mill, most of the physical property were tested. Figures 7 to 12 show effect of Superbulk chemical on Bulk of paper, Porosity of paper, Tearing Strength of paper, in M.D. & C. D., Breaking length of paper in M.D. & C. D. respectively.

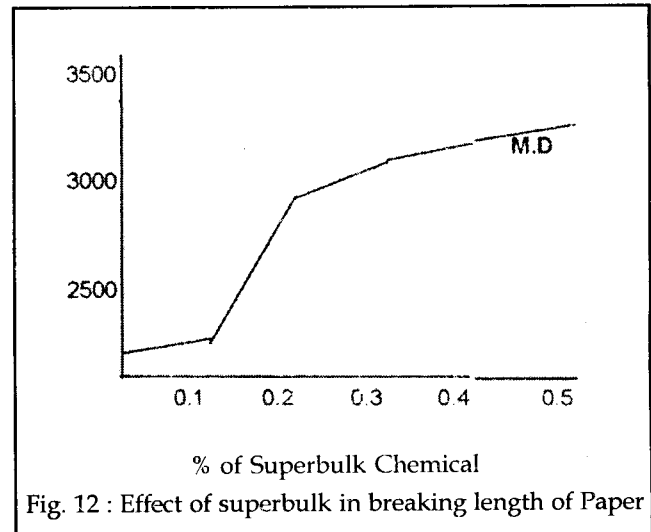
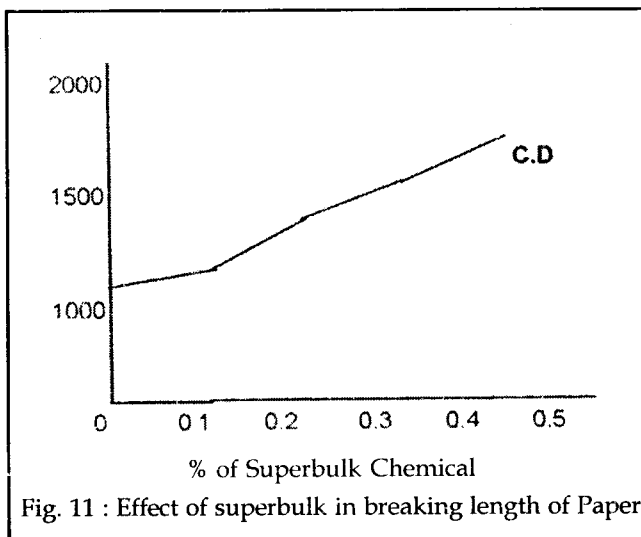
CONCLUSION

With the technological development in Printing and Conversion Industry and increase in usage of Waste Paper as an important alternate raw material to conserve. The Forest, the impacts of Stickies will tend to increase. The Complex nature of Stickies and their deposition will require mill to balance capital expenditure on equipment and chemical cost to maintain machine runability and Paper quality. Several permutation and

GRAPHICAL PRESENTATION OF THE EFFECT OF SUPERBULK IN STRENGTH PROPERTIES OF PAPER



The Figures 9 and 10 represent the Tearing Strength both in case of C.D. and M.D. showing an increase at a dosage level of 0.4%



The Figures 11 and 12 indicate the breaking length of paper both in case of M.D. and C.D. showing an increase at a dosage level of 0.4%

combination in Mechanical equipments were tried out but 100% effective removal of Stickies could not be attained. At the same time the heavy capital cost does not permit many of the small and medium size waste paper based Units to implement the same. It is therefore required that combination of good effective formulated chemical followed with an effective Mechanical Screening and Cleaning system is the only viable solution. Findings with our Stickies Control chemicals indicates that 60 to 70 percent of stickies problem can be

solved. Bulk and softness are not of the most consumer desired properties. Using Superbulk chemical increases the Bulk in paper, improves its smoothness without having any kind of adverse effect on various Strength properties of Tissue Paper, Paper and boards. As softness is a multidimensional perception that includes sight, sound, and touch. In a nutshell, this chemical can be used in all varieties of Paper e.g. Duplex Board, Tissue paper, Card board, Writing and Printing paper etc.