Title: Reduction of stickies related production losses in graphic paper production by systematic assessment and reduction of sticky contaminants in the paper machine loop

Background/Problem area

Germany is leading in paper recycling. The recovered paper utilisation for graphic mass papers is growing faster than the production rate. The average stickies load in recovered paper for deinking grew by a factor of 2.5 between 1996 and 2000. A big variety of technical applications and chemical aids for reducing deposits in paper mills have been developed. These tools open up vast possibilities especially for stickies removal from stock suspension and process water.

The development of process analysis itself, i.e. finding the causes of deposits in mill systems, was not promoted as intensively as the research into deposit control strategies. In a lot of paper mills process optimisation for advanced and successful stickies control took years. The main reasons for this phenomenon are strongly empiric work or false overall strategies. The paper machine specialists often complained that chemical additives did not produce significant effects. In other cases there was no correlation between macrostickies loads and the amount of deposits in the paper machine. Here the influence of microstickies for building up deposits had been completely ignored. Moreover, measuring the depositing behaviour of mill samples has remained difficult until today.

Objectives/Research results

The overall objective of the project is the reduction of paper machine downtime and quality losses during recycled-fibre based graphic paper production. A systematic tool for identifying the main sources of stickies problems in the paper machine loop shall be worked out. Therefore a procedure for characterisation of the depositing behaviour of the stock suspension between final stock and paper machine shall be obtained first. At the end suitable targeted ways or measures for lowering the paper machine deposits have to be considered. The typical flows of macrostickies, microstickies and colloidal substances in the paper machine will be monitored via mass balances. In this way, the build-up of secondary stickies shall be detected as well.

Macrostickies were retained nearly completely within the fiber mat on the paper machine wire. In case of very strong initial dewatering up to 10 % of macrostickies can move into the white water.

When dewatering a fiber mat in the wire section of PTS-sheet former the following tendencies were obtained: By using a retention aid the total retention was 82 % whereas the fillers retention was 52 % and the microstickies retention was between 65 and 70 %. At lower dewatering pressure the microstickies retention was approx. 10 % higher in comparison to fast dewatering. Without retention aid the total retention was 75 %, fillers retention 47 % and microstickies retention 61 %.

During filtration only 5 – 8 % of COD were fixed in the fiber mat in the wire section. Turbidity in white water was 40 % in comparison to the head box. This means a lot of colloidal particles were not fixed at the fibers.

At a newsprint mill a macrostickies retention rate of 90 % was measured (paper grammage 50 g/m²). Concerning microstickies the following tendencies have been obtained: There was no clear correlation between the stock consistency in the head box and microstickies retention. With increasing total retention the microstickies retention increased as well. A higher grammage (thicker fiber mat) will lead to increased microstickies retention.

Application/Economic benefits

Producers of graphic papers in Germany have been in an extremely unfavourable cost/earnings-situation for a couple of years. On the one hand the current market price for graphic mass papers is nearly the same as in 2000. The current average is lower than the price level of 2000. On the other hand the prices for energy have increased significantly. When considering that a lot of small- and medium-sized mills are calculating with earnings margins of only 3 %, then a lot of these companies are working at the limit of profitability.

Small and medium sized paper mills often use lower quality recovered paper grades because of cost cuts. These grades contain bigger amounts of stickies particles. The state of the art in process technology is not available in many cases. Furthermore the mills themselves do not have research capacities and laboratory equipment for measuring stickies. For this reason mill workers often do not have enough expertise in macro- and microstickies prevention. The production losses caused by deposits in the paper machine of SME can accumulate to some 100,000 € per year. In addition mills have to calculate additional costs for paper machine cleaning and improved equipment for stickies separation.

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Remarks

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