Subject: Effluent free production of white top testliner without quality and productivity losses

Background / Problem area
In the last few decades the paper industry has made considerable endeavours to reduce its fresh water consumption and waste water amounts. Today the lowest specific waste water amounts of 4.0 m³/t are found in paper mills using recovered papers without deinking. A number of production plants produce brown packaging papers within closed water circuits. To remain competitive with top selling producers especially small and medium-sized corrugated base paper producers intend to include white top testliner into their product range. Are closed water circuits a technically feasible and profitable alternative for these paper mills? Numerous further questions have to be answered: How to arrange the water circuit? How does the increasing closure of water circuits affect the product quality? Which water quality is needed to achieve the required whiteness of the top layer? Which water treatment is needed? Which are the boundary conditions for closed water circuits to be economical?

Objective / Research results
The project aims at water circuit closure in the production of white top testliner without deinking without losses in productivity and product quality. Rules and procedures for water circuit closure will be elaborated for this grade range on the basis of water quality influences on white and brown lines.

Extensive process analyses have been carried out in two production lines for corrugated base paper. Production data and water circuit design were mapped; water loadings (COD, sulphate, etc.) were estimated. The fresh water allocation and usage was established and quantified, and the performance of waste water treatment aggregates was measured. Based on this measuring data block oriented simulation models were generated in IDEAS. The savings potentials identified in the fresh water system of the paper machine were used to simulate the water circuit loads caused by the individual steps of water circuit closure.

Trials for the brown layer, for the white layer and for a two-layer product with different water qualities were then carried out in the continuous sheet former of the pilot plant station in Heidenau. Any COD elevation clearly reduced strength properties. With process water or biowater used for the preparation of white stock, whiteness decreased. Trials on the decolouration of these waters showed that far reaching solids removal should be the first step to raise stock whiteness and might be sufficient in the case of biowater. Process water can be decoloured by ozone treatment.

In a last project step appropriate water circuit adjustments for circuit closure are being identified. The adjustments refer to water circuit control, salt input, aggregates for chemical-mechanical circuit water purification and especially the assimilation and design of integrated purification aggregates.

Application / Economic benefits
The thresholds for circuit closure are higher in the production of white top testliner than in the manufacturing of brown grades. The water circuits of white production lines are more complex, their fresh water consumption is higher and product requirements increase with higher whiteness levels. The research project aims at generating the necessary knowledge to overcome these thresholds. Water circuit closure in the production of white top testliner is reaching technical feasibility.


Remarks
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