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Research area: Product aims

Paper and paperboard production // Papermaking

Key words:

Measuring procedure, fiber surface charge, broke

Title: Continuous measurement of the fiber surface charge to optimize the broke use in paper production**Background/Problem area**

Broke use varies due to a typically irregular and nonuniform broke formation – also broke varies in amount as well as in composition. According to state of the art solutions are given for fluctuating filler content, consistency and detrimental substance content. However, also the fiber qualities of broke differ from the primary fiber material. The fiber surface charge is central. It describes the adsorbability and, thus, efficiency of electrostatically acting additives. A laboratory measuring procedure for production samples had already been established at the research institute. Motivation for this project was insufficient knowledge to this parameter and its fluctuations in the process.

Objectives/Research results

The aim of the research project was the evaluation of a continuous fibre surface charge measuring procedure for dynamic analysis, valuation and optimisation of broke use.

A measuring setup for the continuous detection of surface charges in process flows was designed, built and tested in the broke line of a wet-strength specialty paper production. The continuous measuring procedure could be technically realised in batch processing. The achieved measuring period of 25 min permits an adequate time resolution of dynamic effects of the stock preparation. The statistic error of measurements ranging from -50 to -120 µeq/g was estimated at 5-8 µeq/g. The method was validated in comparison to the reference lab method ($R^2=0.94$).

The test installation revealed significant fluctuations in the broke pulp. Surface charge influences could be identified. The fact that these influences could only be measured to some extent underlines the need for surface charge measurement. Surface charge fluctuations in the wet end were forecasted by means of a balancing model for the studied case. These fluctuations could be associated with variations in wet strength agent adsorption and, thus, a 5 % deviation (variation coefficient) from the desired wet strength agent content of paper, based on an hourly scale.

Application/Economic benefits

The new surface charge measurement method lends itself for an online implementation that provides high informative value. In industrial application, the continuous monitoring enables a deeper understanding of process dynamics as well as the immediate diagnosis and avoidance of problems related to additives. Considerable economic potential lies in the reduced consumption of wet strength agents and other functional additives, but also in the avoidance of web breaks and deposits leading to production losses.

Project period: 01.10.2008 – 30.09.2010

Remarks

The research project IGF 15815N was being funded by the Federal ministry for economy and technology BMWi.