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Research area: Process aims
Process measuring control technology // Other

Key words:
Recovered paper, online monitoring, NIR spectroscopy

Title: Evaluation of influence of recovered paper quality and composition on the deinking process

Background/Problem area

Sorted graphic paper for deinking (1.11) is the most important recovered paper grade for use in the production of new graphic paper. The composition of the recovered paper for deinking fluctuates considerably. This applies for example to the content of non-paper marterial, the ratio of newspapers to magazines and the percentage of paper to paperboard which are unsuitable for recycling in deinking plants.

The composition of the recovered paper essentially determines the ash content, deinkability, optical properties and macro stickies content. Therefore, fluctuations in composition result in corresponding fluctuations in the quality of the recovered paper. Laboratory measurements can document the quality fluctuations right up to the finished stock and provide information about the plant status and trends. But they are too time-consuming and therefore unsuitable for regulating process stages in real-time.

Against this background, it would be desirable to be able to determine the quality of the recovered paper prior to charging to the drum pulper. This would it make possible to optimise the individual process stages to compensate for composition induced quality fluctuations in the raw materials. It would also then be possible to operate the processes in such a way that the requirements on the quality of the finished stock are reliably met.

Near infrared (NIR) spectroscopy is a measuring procedure that is suitable for measuring material parameters online. It can be used to detect relevant composition parameters of the recovered paper continuously and in real time.

Objectives/Research results

Using a NIR online measuring system at the conveyor to the drum pulper, the composition and changes in composition will be traced based on characteristic absorption values of substances in the recovered paper. The measured NIR data will be displayed as a function of the composition changes calculated from calibration models or as a function of spectral changes. These data will be correlated to relevant control parameters of the deinking process using multivariate chemometric methods. The parameters that are found to be relevant could then be used for process control. The studies will be conducted in co-operation with two paper mills.

In April 2010 the first online NIR measurements were done in a paper mill. Parallel to the measurements, samples from the deinking process were taken and analysed. The results showed that it was possible to determine the composition of the recovered paper for deinking by NIR with a high accuracy. The average composition of the recovered paper was: 93 % deinking papers, 6 % non-deinking papers and 1 % non-paper components. The main fluctuations occurred in the ratio of old newspapers (ONP) and old magazines (OMP). Big changes in this ratio could be correlated with changes in the online NIR determined ash content. The average ash content of the recovered paper on the conveyor belt was 26 %. The NIR ash data showed a very good correlation with the ash content of samples taken from the pulper. Further analysis of the stock samples taken from the process will be done.

Measurements in other paper mill are planned and will be done in the second half of 2010.

Application/Economic benefits

The results of the research project can be used to bring about improved consistency and economy of the overall process in the deinking plant and ultimately enhanced product quality. In detail, the advantages are as follows:

- Consistent sub-processes
- Efficient checks of performance data (efficiency, speed)
- Goal-directed optimisation of equipment and products
- Savings of chemicals, energy, water and effluents
- Reduction in repair and maintenance costs

Project period: 01.12.2008 – 30.11.2010

Remarks

The research project IGF 15905 BG is being funded by the German Federal Ministry of Economics and Technology BMWi.