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Research area: General aims
Resource savings

Key words:
Recovered paper, optical properties, modelling, prognosis, best costs strategy

Title:

Minimizing raw material and process costs during built up of defined optical properties in bright papers made from recovered fibres

Background/Problem area

The production of high-quality bright papers for graphic and non-graphic use made from recovered paper is subject to high cost pressure. Office papers, high-quality printing paper, recovered paper-based tissue paper and white top liner all belong to the paper grade studied. Due to the high requirements placed on the optical properties, a large number of recovered paper grades from grade groups 2 and 3 are used for these products, although they differ significantly regarding utility value, required treatment processes and costs, availability and purchase costs. Fluctuations in recovered paper quality as well as changes in availability and cost structure raise the question of how production can realize constant product properties at the lowest possible costs.

PTS has developed methods and algorithms for overall cost, product and process optimisation which until now have been used for the simulation-assisted prognosis of strength properties and cost optimisation in the production of corrugated base papers. These tools can be used to meet the practical business demand of making additional strategy-oriented cost accounting based on changing raw material compositions and production conditions. Within the project, the methods and algorithms developed for simulating strength properties are to be expanded to cover the specific production conditions and quality properties of deinked stock for the production of bright papers, where the focus is primarily on the optical property requirements. This would give the producers of these papers an opportunity to optimally coordinate raw material properties, process parameters, product properties and cost factors.

Objectives/Research results

The research project is intended to make a contribution to minimising the costs of producing white papers based on recovered fibres that place high requirements on optical properties. Final result should be the creation of a simulation model for calculating optimal raw material use in consideration of the treatment processes in order to achieve the lowest possible costs at defined optical properties of the furnish.

The following results were uptained in the finished workpackages up to now:

- a suitable measuring method for small dirt particles (< 50 µm) was defined and the corresponding measurement of big dirt particles (> 50 µm) was improved
- a new application routine for ELREPHO measurement at different wavelength was implemented
- a detailed database for optical properties of many different recovered paper grades and several base papers with different printing principles was fulfilled
- a model for the prediction of optical properties of the pulp suspension during the process steps bleaching and washing was created at the basis of detailed lab tests and industrial experience
- the data for the increase of optical properties during stock preparation system was measured in several paper mills

Application/Economic benefits

The economic benefits are derived by using the simulation model within the framework of pre-process optimisations. Paper mills can use variation calculations to determine optimal raw material use or to assess process concepts and thus reduce the costs of raw materials, additives, energy, waste and equipment needed for plant reconstruction or new plant concepts. All variable and essential fixed costs (e.g. investment costs) are taken into consideration when calculating total production costs for different scenarios.

After completion of the project, the calculation models will be offered to paper mills by way of a web-based simulation tool and may thus be used sustainably as aids when taking strategic decisions. Other users are planers, engineering offices and plant manufacturers.

Project period: 01.01.2010 - 31.12.2011

Remarks

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