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Research area: Process aims

Paper and paperboard production // Paper production

Key words:

Recovered paper, deinking, ink particles, brightness, modelling, forecast

TITLE:

Forecasting method for the brightness of deinked pulp (DIP) as basis for optimization of ink removal processes

Background/Problem area

The optical characteristics of paper – especially brightness – are of particular interest in the production of graphic papers and of packaging papers increasingly used as advertising media. Growing contaminant loads of the starting materials and the high demands made on finished papers, in particular on the brightness of graphic papers, require additional measures of recovered paper treatment to improve the optical quality of recycled fibre pulps. The methods used to remove these contaminants - especially ink particles - are more costly and time-consuming, leading to higher investment and operating costs.

To better estimate the effects of new technologies and their associated process concepts, it would be extremely helpful to forecast the achievable quality of finished pulps, in particular their brightness. This would enable planers, consulting engineers, plant manufacturers and operators (paper mills) to better manage the high technological and planning risks involved.

No method is currently available which can describe the quantitative relationship between brightness and pulp characteristics (especially ink particles / background brightness) in order to forecast the brightness based on balanceable and simulatable pulp characteristics (pulp composition, background brightness, ink particle loading and size distribution).

Objectives/Research results

Aim of this research project is the development of a method making it possible to reliably forecast the brightness of finished and other pulps on the basis of the following balanceable parameters which can be influenced by process optimization:

- loading and size distribution of ink particles,
- pulp composition (fibre fractions, fillers),
- background brightness based on lignin content.

The result of the research project will be a method making it possible to reliably calculate the brightness taking into account the properties of ink particles and other suspension components. The following results are envisaged in the course of the project work:

- provision of models to describe the relationship between the absorption effects caused by ink particles and the size distribution or total area loading of ink particles,
- utilization and adaptation of calculation approaches to determine the proportional effects of ink and other suspension components (fibres, fillers, …),
- verifying the suitability of forecasting algorithms for practically relevant, routine application, based on extensive practical data,
- verifying the quality of models as a prerequisite for combining them with process models later on to ensure reliable result forecasts.

Application/Economic benefits

A calculation method for brightness is a key prerequisite for simulation-based optimizations of ink removal processes as well as for stabilizing and improving the DIP quality. The envisaged research results can therefore be used primarily by companies producing or using deinked pulps. The calculation method is not limited to deinked pulps, though. There is a growing demand for high brightness also in the production of certain packaging papers, which must be met by suitably selected raw materials and treatment processes.

The calculation method contributes significantly to the transfer of knowledge about the optimization of individual process stages and evaluation of overall pulp treatment concepts, resulting in the following main economic effects:

- reduction of raw material, disposal and chemical costs,
- less costly and time-consuming process optimizations and reduced risk of new process concepts,
- fast estimation of the effects of alternative raw materials.

Project period: 01.01.2010 – 31.12.2011

Remarks

The research project IGF 16315BR is being funded by the Federal ministry for economy and technology (BMWi).