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Research area: Process aims

Pulp production // Recovered paper treatment

Key words:

Deinking, residual printing ink, defibering, repulping

Title:
Improving DIP quality by influencing the detachment / redeposition behaviour of printing inks (residual printing inks) during the recovered paper treatment process

Background / Problem area

The quality criteria for deinked pulp (DIP) focus on their optical properties such as brightness, luminosity, chromaticity coordinates and cleanness. The recovered paper collection level is currently very high and, as experience has shown, causes ever greater deterioration of the quality of the available recovered paper. The consequences are difficulties in maintaining the standards with respect to yield and optical properties – especially when such DIP is used for the production of high-grade recycled fibre-based new paper. Changes in print products also contribute to quality problems. Residual ink particles that have not been removed during deinking impair DIP quality and result in lower brightness of the deinked pulp. The optical quality of pulp and, consequently, economic efficiency of DIP use are particularly impaired by residual ink particles adhering to fibrous material. Residual ink particles adhering to fibres lower the performance of bleaching chemicals, for example. They also render the fibres hydrobphobic, leading to higher reject levels in the flotation stage and, thus, increased pulp losses. The knowledge of what causes or creates the presence of residual ink particles adhering to fibres is a prerequisite for developing corrective technological measures designed to minimize the residual ink content.

Objectives / Research results

Aim of this research project was the improvement of optical properties of deinked pulps focusing on the minimisation of residual inks adhering to fibres. Main aims were the identification of causes of the presence of residual inks adhering to fibres in deinked pulp and their relevant influences, to derive possible technological measures to minimise them.

Basic idea of the approach was the separate study of redeposition processes, i.e. the phenomenon of redeposition was systematically investigated by model experiments using standard ink particles and varying relevant influences during the combined treatment of ink particles and unprinted pulp.

The experiments have proved that it is possible in principle for ink particles to redeposit themselves on fibrous materials during treatment of offset and gravure print products, the printing ink systems occurring in relevant quantities in practice (process stages defibering and disperging). The occurrence and level of redeposition depend on specific conditions. Prerequisite for redeposition is the presence of free ink particles and a certain share of printing ink in the pulp, which is expressed as the light absorption coefficient K at 700 nm. The latter is influenced by the amount and particle structure of printing inks (very small ink particles tend to redeposit themselves on fibres). The particle structure depends on ink type and process conditions.

Redeposition during defibration is decisively influenced by the detachment behaviour of ink particles (ink type/paper, age of print product), by chemical conditions (redeposition is lowered by deinking chemicals) and defibration time. Ink content and disperging time (fragmentation of ink particles) are relevant influences during disperging.

Redeposition contributes to the presence of residual ink particles adhering to fibres and lowers the optical quality of deinked pulp. The knowledge gained about the redeposition behaviour of printing inks in fibrous materials has led to recommendations for process-technological measures designed to minimize the share of residual ink particles adhering to fibres.

Application / Economic benefits

A fundamental knowledge of the behaviour of printing inks during the deinking process is the basis for specific process solutions designed to improve DIP quality. It also makes a contribution to the further development of printing inks with respect to their deinkability properties. Reducing the residual printing ink can improve the optical quality of the DIP and reduce the losses during preparation (selective flotation) and the costs of the bleaching stage. A deinked pulp with a lower level of residual ink prior to the bleaching stage, for example, has a significantly higher potential for improvement by bleaching. Enhanced quality properties of the DIP contribute to the broader use of deinked recovered paper pulps. Such broader use still holds considerable concealed cost reduction potential, especially in the case of SC and LWC papers and high-grade tissue products.

Project period: 01 January 2007 – 28 February 2009

Remarks

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