Title:
Process-related optimisation of deinking plant efficiency to improve the optical properties of the deinked pulp by selectively influencing the particle size distribution of printing inks

Background/Problem area
The quality criteria for deinked pulps (DIP) centre on their optical properties, i.e. brightness, luminosity, chromaticity coordinates and cleanliness. In order to efficiently eliminate the printing ink during flotation deinking, the detached ink particles must be present in a certain size spectrum. Particles that are too small and those that are too large pose problems during ink removal. The non-removed particles have a negative effect on the optical properties of the DIP. Small particles in particular accumulate in the circuit water of the deinking plant and, when the water is reused, cause the DIP to darken. The parameters which effects the particle size distribution of the ink residues present in flotation are manifold. The print product and the conditions during pulping play a decisive role in ink detachment and particle size distribution. Important factors in this context are the chemical relationships, operating conditions and water quality. Hence, to ensure efficient ink removal, process-related conditions must be selected so that the ink particles exist in a suitable size spectrum.

Objectives/Research results
The objective of this research project is to improve the optical properties of DIP by optimising the removal of the printing ink during flotation deinking by creating an ink particle size distribution that is optimally suited to flotation deinking. Appropriate process solutions are to be developed that permit the particle size distribution of printing inks in the suspended RCF pulp to be influenced selectively, thus optimising the efficiency of ink elimination during the flotation process.

Studies to ascertain the consequences of important physicochemical factors and their interactions (deinking chemistry, pulping temperature and duration) on the particle size distribution and on the results of flotation have been conducted. These consequences and their interactions are being determined by design of experiments (DoE) (factor analysis). The factors which have been analysed are the influence of soap (concentration and type), influence of pH during pulping, and the effects of the pulping temperature and duration as physical operating conditions. The tendencies found show that the deinking result is primarily influenced by the deinking chemicals used. A possible impact of the defibration time is superimposed by the chemical conditions of defibration.

Application/Economic benefits
The hoped-for research results will be used to develop process solutions for improving the optical properties of DIP that will then be made available to recovered paper processing paper mills. An increase in ink elimination during the flotation deinking process with optimum adaption and dosage of the necessary process chemicals and process control will make it possible to improve the profitability of the recovered paper treatment process. Quality improvement serves to expand the range of DIP applications (allowing it to be used in high-quality graphic paper, especially in SC and LWC paper), thus also creating new savings potential (production of a high-quality DIP from available recovered paper).

Project period: 1st July 2003 – 30th November 2005

Remarks
The research project AiF 13632 is funded by the German Federal Ministry of Economics and Labour.