Research institute:
PTS Heidenau
Pirnaer Straße 37
01809 Heidenau

Internet: www.ptspaper.de

Head of the research institute:
Dr. A.-B. Kerkhoff

Project leader:
Lutz Hamann
Tel: 03529 / 551-657
Fax: 03529 / 551-899
E-Mail: L.Hamann@ptspaper.de

Research area: Product aims
Production of paper and board // stock preparation

Key words:
Key words: recovered paper, flotation, deinking, printing ink particles, dirt specks, modelling, costs

Title:
Development of a computer-assisted prediction method for reducing the technological and planning risks involved in new process concepts for deinking plants

Background/Problem area

The high requirements placed on finished paper, especially the brightness requirements of graphic papers, require ever more resource-intensive methods to remove contraries, especially printing ink particles. This situation is becoming all the more pressing because the starting pulps are loaded with ever greater concentrations of these contraries.

The tried and tested process stages for ink removal (e.g. flotation, dispersion, bleaching) are being operated in complete plants that are becoming ever more resource-intensive and this, in turn, leads to higher investment and operating costs.

To offset the associated high cost pressure, a search is currently underway to discover new concepts aimed at simplifying the process design, although the quantitative impact of such designs on the finished paper has yet to be verified. Well-established process stages will be employed in new circuitry combinations under modified process conditions.

If new process concepts of this kind are suggested or scheduled, a quantitative evaluation of the overall concepts would currently be out of the question. Implementation or realisation of such concepts goes hand in hand with high economic, technological and planning risks for planners, engineering offices, plant manufacturers and owners (of paper mills).

Objectives/Research results

The objective of the research project is to develop a computer-assisted prediction method. The improved design and dimensioning of new concepts for deinking plants in paper mills is intended to thus reduce unnecessary high investment costs for new plant constructions and rebuilds and reduce the technological and planning risks as well. This prediction method is intended to make the core processes of the deinking process completely describable in mathematical terms. The technological benefits, the impacts and possible risks of new process concepts will be able to be quantified and thus rendered controllable.

The prediction method is to be tested based on the data taken from a concrete paper mill. Another step is intended to evaluate new process concept alternatives in a universally applicable manner, thus contributing to the development of optimum process concepts in paper mills.

It will then be possible using such a completed prediction method to reliably predict the consequences of new process concepts on the optical properties of finished stock and finished paper. This in turn will serve to minimise the high implementation risks inherent in new process concepts.

Now that the core processes of the deinking process have been rendered mathematically describable on the basis of the 4-mechanism model, a corresponding computer model is currently being constructed and tested in a paper mill in East Germany.

Application/Economic benefits

The costs of concept development and necessary rebuilds or new plant constructions can be minimised by using the prediction method. Concept development will be brought into focus; the technological project risk will also be minimised. It can be expected that the new and modified process concepts that are implemented will allow paper mills to enjoy significantly reduced costs for raw materials, disposal costs and costs of required chemicals.

Planners, engineering offices and plant manufacturers will also have a possibility to submit their own solutions on the basis of the prediction method.

Manufacturers of the plant technology required for ink removal and the supplier industry (for measurement engineering, additives) can enhance the applicability of their products significantly by utilising the calculation and prediction procedures developed in the course of the project. The benefits arise from the fact that the effects of using a particular technology or the consequences of optimisation measures that are implemented using a particular technology can be predicted in quantitative terms.

The modelling approaches that are developed during the project can be used by suppliers in the process measuring and control engineering sector to develop software-based optimisations.

Project period: 01.01.2008 - 31.12.2009

Remarks

The research project IW 080059 is being funded within the scope of the IW programme by the Federal Ministry of Economics and Technology.