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Research area: Product aims

Paper, paperboard and board // Packaging papers and paperboard

Key words:

Recovered paper, material composition, recovered paper sorting plants, separation methods, optical characteristics

Title: Innovative complementary dry treatment technologies to upgrade a fraction in recovered paper sorting**Initial situation/Problem area**

Automated plant systems for dry recovered paper sorting generate a fraction in the fine sieve classification underflow which is currently marketed as „Mixed papers and boards“ (grade 1.02) or so-called „Bright mixed papers and boards“. The fine sieve classification stage serves to separate packaging paper and board as well as unwanted materials of smaller particle size from the recovered paper and board. Pre-tests carried out by the research institute showed a high share of graphic papers (approx. 66 %) in this fraction, up to 50 % of which were wood-free papers. Apart from the high share of graphic papers, the fine sieve fraction contained high shares of carton boards and non-paper components, which is typical of this process stage. The high graphic paper content implies losses of bright recycled fibres for graphic applications in the paper industry, and economic losses for sorting plant operators. As a matter of principle, the share of non-paper components must be reduced before using fine sieve fractions in the paper industry. For the production of bright tissue papers or bright plies for packaging paper and board, it is also necessary to reduce the share of corrugated board and cartons. This requires suitable final screening systems. The additional sorting steps and small mass flows of the fine sieve concept make it necessary to take a closer look at its operating and logistics costs.

Objective/Research results

Aim of this research project is the development of a specific final screening method for fine sieve fractions and evaluation of its economic efficiency. The new method is intended to improve the raw material utilisation and economic efficiency especially in productions of sanitary papers or protective layers for packaging applications as well as for the operators of recovered paper sorting plants. The economic efficiency analysis of the final screening concept will be based on real structures of the German states of Brandenburg and Saxony regarding the locations of recovered paper sorting plants and paper mills, recovered paper demand and sorting capacities.

Data about sorting plant technologies, material flows and the material composition of fractions has been collected by analysing the situation as-is in five recovered paper sorting plants. In four of these plants, the fine sieve fractions accounted for 9 % of the incoming materials. The share of graphic papers amounted to 73 %, packaging papers and board accounted for 14 % on average. The shares of unwanted materials varied greatly across the plants, ranging from 6 to 25 %.

Initial studies of separation principles for the treatment of fine sieve fractions were done using a screening machine with square openings of 40 mm edge length. The tests showed an effective separation of non-paper components combined with small graphic paper losses. Further tests using a conical air-flow separator showed an effective separation of graphic papers from corrugated and carton boards by this method due to grammage differences. The removal rate of unwanted materials was comparable to that achieved by sieve classification.

Laboratory and pilot plant tests of fine sieve samples taken from the various plants and of the various paper grades contained therein were done to measure the optical characteristics and development thereof across the typical treatment processes of graphic papers. The test results form the basis for a calculation model which can be used to forecast the brightness development of mixtures comprised of various paper grades across the treatment process.

Application/Economic benefits

The use of fine sieve fractions will increase the availability of superior grades of sorted graphics for deinking especially for the production of sanitary papers and protective layers for the packaging sector. These applications are characterized by the use of converting waste comprised of medium recovered paper grades whose availability is becoming increasingly problematic in the wake of printing and converting process optimizations and grammage reductions. A suitable final treatment for the fraction currently marketed as mixed recovered papers and boards (grade 1.02) would improve the revenue situation of sorting plant operators and create additional market opportunities for manufacturers of dry sorting plants.

Project period: 01.01.2009 - 31.12.2010

Remarks

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