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Research area: Product aims
Paper, paperboard and board // Packaging papers and paperboard

Key words:
Recovered paper, corrugating base paper, wet-end starch, dry strength agent, high-consistency range, circulation water

Title: Developing a process concept to increase the production of corrugating base paper by substituting part of the surface starch applied

Background/Problem area

Corrugating base paper production is characterized by a wide range of different grades offering various physical and optical properties. A recovered paper utilization rate of 109 % in the corrugating base paper segment shows that the production of these papers is exclusively based on recovered paper in Germany. Increasing recovery and high recycling rates have led to strength losses as well as increased shares of unwanted materials and paper-bound contraries in the fibrous raw materials. Producers take various measures to compensate for the strength losses caused by multiple recycling, for example surface starch application, using superior fibrous raw materials, pulp refining etc., all of which are very expensive. Substituting natural and synthetic dry strength agents for at least part of the energy-intensive surface starch application is therefore a particular concern of these producers. Dry strength agents are being used in the process stages of constant section and stock preparation at consistencies of only 1 - 3,5 % today. This consistency range is characterized by high contrary and fines contents and low fibre concentrations, conditions which are detrimental to additive performance. This situation applies particularly to corrugating base producers, whose mill water circuits are largely or even completely closed.

Objective/Research results

Main objective of the proposed research project is the development of a process concept for admixing synthetic and natural dry strength products in the high-consistency range in stock preparation systems of corrugating base paper mills. This is intended to improve the strength properties of the papers produced. Investigations into the high-consistency method are based on the following approach: Increasing the performance of additives by dosing them in a process stage characterized by low fines and contrary concentrations and by introducing them into the fibre material by intense mechanical action.

The research project investigates the influences of relevant process parameters, pulp characteristics and process water properties on the adsorption behaviour and efficiency of dry strength agents. The process parameters required for high-consistency admixture and redilution will be defined. Another focal point is a cost-benefit comparison with the strength-enhancing measures commonly used in industrial practice today. In this context, the possibilities for eliminating one layer of surface starch will be specifically investigated.

Laboratory tests were done to determine the effects of cationic wet end starch and synthetic dry strength agents added in the high-consistency range in connection with different pulps and water qualities. An important aspect was the salt load of process waters, whose adverse effects on additive adsorption and –performance could neither be reduced nor compensated for by the admixture in the high-consistency range. In a stock-water system having a conductivity of up to 2000 µs, the admixture of cationic starch in the high-consistency range using a kneader led to clearly better strength properties than the starch addition at 4 % consistency.

Application/Economic benefits

The high-consistency admixture of strength-enhancing additives has not yet become established in the production of packaging paper and board. The project will identify the prerequisites for and possible effects of the method to create the basis for its practical implementation. The main benefit to corrugating base paper producers is an improved product quality enabling them to serve additional market segments. Under certain conditions, further benefits can be gained from the reduced consumption of specific drying energy and possible production increases resulting from it. Starch and chemical producers can benefit by increasing their market volumes.

Project period: 01.01.2009 – 31.12.2010

Remarks

The research project IW 090115 is being funded by the German Federal Ministry of Economics and Technology BMWi and carried out under the InnoWatt programme.