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Research area: Process aims

Paper and paperboard production // Stock preparation

Key words:

Recovered paper, testliner, increase in strength properties, ultrasonic, ultrasound, mechanical high-frequency

Title: Application of high-frequency alternating pressure process to increase strength properties of corrugating stock**Background/Problem area**

Packaging paper represent the second largest product group within the paper industry in Germany. The production of packaging material and therefore also corrugating stock uses a high amount of recovered paper of the ordinary grades. The fibres of this raw material have mostly passed through several numbers of recycles. The multiple drying of the paper during the paper manufacture causes a hornification of the fibres. The swelling and the flexibility of the fibres decreases. Mechanical processes – especially refining – damage the fibres and cause a reduction in the fibre length and increase the amount of fines. Hence these fibres have a limited bonding power and strength potential. Additional the basis weight of corrugated stock is getting lower. That leads to higher requirements to the strength properties in corrugated stock. The material recycling of recovered paper in Europe by the paper industry will increase because the time of circulation of short-lived paper products is shorten.

For producers of corrugated stock result the following problems: On the one hand are increasing costs for raw material, energy, additives and transport. On the other hand produce an increasing sales output of corrugated stock a competition for the raw material recovered paper. That causes a critical situation for particularly small and medium-sized companies of the corrugated stock producer.

In the project two technologies of high-frequency alternating pressure process will be determined – ultrasound and mechanical high-frequency. Ultrasound is sound with a frequency from 20 kHz up to 10 MHz. In the project high power ultrasound will be used with an intensity of more than 20 W/cm² and a frequency of 20 kHz. The mechanical high-frequency is a technology with a rotor-stator system. The circumferential speed of the rotor is more than 30 m/s. Both technologies produce cavitation that affect the fibres morphology and therefore the properties of the paper.

Objectives/Research results

Aim of the research project is to determine the technological benefit and economic efficiency of high-frequency alternating pressure processes by using ultrasound and mechanical high-frequency in the stock preparation of recovered paper. The project investigates whether a gentle treatment of the fibres and therefore a better use of the raw material is possible. For this reason an increase in strength properties of the product corrugated stock will be expected. The project aims for the following results:

- Estimation of suitability of the processes ultrasound and mechanical high-frequency to control the fibre morphology properties.
- Development of technological concepts to increase the strength properties

Based on the investigations a technological and economical concept for an implementation of the technology into the industry will be generated.

Application/Economic benefits

The project results aim for recovered paper treatment to ensure the strength properties in the product corrugated stock. This improves the competitiveness of producers of corrugating stock by using a more cost effective production. The technology concepts of this project show possibilities for the reduction of additives or energy intensive process steps (refining). The project offer

- the reduction of costs in the stock preparation
- to reduce additives
- to reduce the use of higher quality grades of recovered paper
- to reduce or stop the refining

This is especially for small and medium-sized companies important to produce the required product properties. Additional the – in this area mostly small and medium-sized - machine building benefit by the project results. For the case of success results the companies in the machine building can expand their portfolio or work in new markets.

Project period: 01.08.2008 – 31.07.2010

Remarks

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