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**Research area: Process aims**

Paper and paperboard production // Surface treatment

**Key words:**

starch preparation, packaging paper, surface sizing, cavitation, ultrasound, ultrasonic

**TITLE:**

## Preparation of surface starch by using cavitation for the corrugated base paper production

### Background/Problem area

Corrugated base paper is basic material for the production of corrugated board. The production volume of corrugated board in Germany is more than 7 millions tonnes per year. Required strength properties as well as stiffness properties of corrugated base paper is mostly achieved by surface sizing of the paper with starch within the drying section of the paper machine. A new starch preparation process by using cavitation should improve the workability of the starch and also its bonding power.

To ensure a penetration of the starch into the base paper in the size press or film press it is necessary to decrease the viscosity of the starch solution. This will be achieved by a molecular degradation of the starch by a treatment with thermo-oxidative or enzymatic treatment. Though the degradation the starch loses bonding power and adhesion force that result in a decrease in strength potential.

### Objectives/Research results

The objective of this research project is to detect the applications limits, operating conditions and achievable efficiency of the cavitation to prepare surface starch for the production of corrugated base paper.

For the preparation of the starch two methods will be investigated - high frequency vibrations (ultrasound) and hydrodynamic generation (Venturi nozzle). The comparison in assessing the distinction of the new cavitation based process with the conventional preparation processes (thermo-oxidative and enzymatic) will have the focus on the rheological properties und thus workability of the starch during surface sizing and also achievable increase in strength properties of the paper.

The investigations were carried out with wheat, potato and corn starch solutions. This investigations show a decrease of viscosity to lot less than the half of the initial value by cavitation treatment (ultrasound) of the starch solution for a consistency in the range of 3 g/l up to 100 g/l.

### Application/Economic benefits

The project is aimed at the use of a new process for starch preparation for the sizing of paper by application of surface starch. Main product group is corrugated base paper with recovered paper as raw material due to the high market volume of this product group.

An economic production of corrugated base paper requires the use of recovered paper of the ordinary grades (Group 1) mainly mixed papers and boards (sorted) and supermarket corrugated paper and board. However this fibre raw material offers an insufficient strength potential. Important strength properties of corrugated base paper are the bursting strength and the compression strength, particular in cross direction.

The new cavitation based preparation process offers a new possibility to set the molecular weight and hence the strength potential of the starch. On the one hand this could make it possible to process the starch at a higher consistency with the same strength properties that would reduce energy costs in the following drying section. On the other hand this could provide a starch with a higher strength potential at the same level of viscosity that would make it possible to reduce the needed amount of starch.

The size press and film press vary in the consistency of the starch solution. Film presses run with a higher consistency of more than 100 g/l. Due to the increased use of film presses for surface sizing the cavitation based preparation of starch shall be carried out with a high consistency.

**Period of time: 01.01.2012 – 31.12.2013**

### Remarks

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