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Research area: Product Aims

Paper, paperboard and board \\ Graphic papers

Key words:

Paper composites, dimensional stability, curl

Title: Development of a tool for describing the design and production conditions of paper composites with a high dimensional stability

Background/Problem area

Paper composites, i.e. multilayered materials with at least one layer of fibers, are used on a big scale in a wide variety of mass and specialty papers (e.g. corrugated boards, folded carton boxes, decor papers, printing and photographic papers).

Runnability and the quality of paper composites are affected significantly by flatness disturbances as curl and margin waviness. Such deviations from flatness are particularly determined by climate changes (humidity, temperature) and influences during production (drying, moistening or spraying, coating …), which yield to varying expansion and shrinkage of the single layers or even within a layer. Also mechanical parameters such as the modulus of elasticity depend on humidity and influence the stiffness and therefore runnability, as well.

Paper composites with up to 7 layers are used to satisfy demands on quality at specialty papers such as high-value thermo sublimation and ink jet photographic papers. Tailoring the humidity dependent mechanical interactions of the single layers with each other is very important for demands on quality and runnability (high performances).

Objectives/Research results

Within this research project a tool has been developed which allows a reliable prediction of dimensional stability of paper composites using and enhancing existing models from literature. Hereby, in contrast to former solutions, the influence of temporary climate changes giving rise to locally varying moisture contents and the influence of printing inks were studied for the first time.

Application/Economic benefits

The aim of this research project was a tool which allows to fully leverage any existing enhancement potential when designing paper composites with ultimate flatness behaviour. In future the tool will contribute to

predict the flatness behaviour of paper composites,

design innovative paper composites with improved dimensional stability and

select paper composites purposefully as well as benchmarking their production conditions.

Therewith, conclusions of practical relevance with respect to the mechanical properties of paper composites under varying climate conditions can be made taking requirements of the market into account:

fast forecast of composite properties, saving time in product development,

reduction of experiments at paper machines and test days with their inevitable influence on production down-time and waste, quicker response to changing customer requirements.

Project period: 01.04.2008 – 31.03.2010

Remarks

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