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Research area: Product aims

Paper and paperboard // graphic papers

Key words:

Measurement technology, measuring procedures, penetration measurement, paper evaluation, offset paper, offset printing, print results

TITLE:**Developing a system for multi-dimensional, range-independent measurement of the dynamics of liquid penetration in paper and paperboard****Background/Problem area**

Time behaviour and the constancy of paper properties in the x, y and (z) direction play a major role in many converting properties and in the converting results. Only in the rarest cases, however, do the currently used measurement technologies for paper evaluation provide time- and/or range-independent measured data. Thus, they are not entirely suitable for estimating the results of converting. This becomes obvious, for instance, with print unevenness (mottling) caused by local fluctuations in print density. These fluctuations are to a great extent due to the local differences in the penetration of liquid into the paper in addition to other factors. At present, however, there are no available measuring systems that are capable of conducting range- and time-independent measurement.

Objectives/Research results

The objective of the project is to develop a cost-effective, production-ready system for range-independent measurement of the dynamics of liquid penetration in paper and paperboard (a multi-dimensional penetration dynamics analyser) and the conversion into a prototype. Its intended use is to be able to estimate the behaviour of paper and board during the converting process. Printability and in particular uniformity in full tones and halftones rank high in this context. Other essential envisioned functionalities include: high range and time resolution, easy handling of the samples, rugged instrument construction (required for production-oriented use), simple operation (touch screen), short measurement and evaluation times, high reproducibility, range-independent display of important, material-specific penetration characteristics, meaningful measurement protocols, graphic illustration of local penetration, data storage and administration.

Print samples with varying printability (manifestation of mottling – measurement by means of DOMAS and visual evaluation) and the corresponding unprinted papers were procured. These papers were evaluated using conventional measurement technology. In addition, the papers were measured with the emtec PEA module (measurement field of 32 (1x1 mm²) ultrasonic sensors). A significant correlation with print unevenness could not be found and this confirms the necessity of developing a new measurement system.

In the meantime, an initial prototype of the new multi-dimensional sensor has been developed for evaluating the dynamic penetration of liquids. Initial test measurements and software developments are currently underway.

Application/Economic benefits

The fast, reproducible availability of meaningful, range-independent penetration characteristics, especially of the material surface that is relevant for converting processes, is an essential prerequisite for real-time quality control and for predicting the converting properties. It is therefore the foundation for a goal-oriented product and process optimisation and will result in considerable cost savings to the manufacturers and converters of packaging material and paper. The various factors that affect printability can then be accurately and systematically studied on the basis of many different measuring fluids.

Period of time: 01.05.2012 – 30.04.2014

Remarks:

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