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Research area: Product aims

End products made of paper, paperboard and board // print products

Key words:

Dimensional stability, printing, web-fed offset, sheet-fed offset, paper, paperboard

Title:
Analysis and analytical assessment of dimensional stability in printing papers

Background/Problem

Paper tends to undergo dimensional changes when being in contact with liquids or moisture. This is an undesirable effect in most manufacturing and converting processes of paper as well as during its use.

Dimensional stability is an important prerequisite for preventing register deviation and shortwave defects especially in offset printing.

Register is the correct alignment of colours in multicolour printing and one of the key influences on the image definition perceived and, thus, on printing quality.

Register deviation is the main cause of complaints received by printers using modern web-fed offset presses running at more than 15,000 sheets per hour or 15m/s.

Paper undergoes repeated dimensional changes in multicolour printing due to the repeated exposure to printing inks and fountain solutions (in offset printing) and intense drying between the different printing units.

No test method is currently available to predict the dimensional changes in paper under the conditions of offset printing, i.e. brief contacts of one paper side with the fountain solution.

Objective/Research results

The main objectives of the project were:

- Analysing the processes occurring in printing papers due to the defined moistening of one paper side with fountain water films
- Designing a new measuring technology based on commercial test printers which makes it possible to simulate dimensional changes in paper under near-practical conditions, i.e. the application of a fountain water film on one paper side
- Systematic study of the relationships between paper formulations or papermaking parameters and their effects on dimensional stability

The following results have been achieved:

- Development and testing of a measuring unit allowing the defined moistening of paper strips with a standard fountain water film and image-analytical measuring of dimensional changes in the paper.
- Assessment of dimensional changes in MD and CD in commercial papers
- Comparative assessments by means of conventional moisture and wet expansion measurements of paper
- Work still in progress: systematic study of the relationships between papermaking parameters / printing paper formulations and their effects on (potential) dimensional changes as well as verification of the R&D results by means of industrial converting results (multicolour offset printing)

Application/Economic benefits

The measuring device developed in this project makes it possible to monitor and control the dimensional stability of printing paper under industrial printing conditions. Quality losses leading to complaints can thus be avoided. Moreover, the device can be used to develop paper with limited shrinking tendency and extensibility.
This will benefit especially printing paper manufacturers and printers. A 10% reduction in the number of complaints could save them approx. 650,000 € (Germany) or 100,000 and 200,000 € (New Länder) per year, not including printing machine standstills or the time required for reprinting rejected print runs.
Furthermore, it will enable paper producers to specifically select fillers, wet strength agents or other chemical additives in order to increase the share of recycled fibres substituted for expensive virgin fibres. This will be of benefit especially to major offset and newsprint manufacturers in the New Länder, all of whom are using recycled fibres as raw material.
Another market is manufacturers of testing equipment, who will be able to offer test printers with the additional feature of dimensional stability testing for offset papers.

Project period: 01.01.2006 –30.06.2007

Remarks

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