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Research area: Product aims
Paper, paperboard and board // Graphic papers

Key words:
Offset printing, surface tension

Title:
Examining the effects of surface-active substances in coating colours on offset printability

Background/Problem

Ink transfer to and trapping by the paper are the determinant factors of the print quality of the finished print product. The process of ink transfer is dependent, among other things, on the finish of the paper. Surface tension is of special importance in this context, since it determines the wettability of the paper as the printing substrate with respect to the printing ink. As an element for characterising the printability of paper, however surface tension has scarcely been taken into consideration, and it thus comes as no surprise that there is a lack of information on how great its impact actually is on print-related properties such as printing gloss, brilliance and uniformity and hence for the optimisation of coating compositions. Nor is it known to any extent how much surface tension is influenced by surface-active substances in the coating colour.

Research objective/Research results

The objective of this research project is to evaluate the effect of the type and amount of different surface-active substances in the coating colour on the surface properties of coated paper that are responsible for its processing and use. The project focused on surface tension and its impact on the printability of paper.

At first paper samples were obtained from several offset paper manufacturers. The samples were tested on their properties, including the measurement of surface energy. In spite of the broad range of surface tension values measured, the paper samples showed very similar printability properties. Therefore it was not possible to define a common range of surface tension that is necessary or tolerable for good print quality.

During the project work coated paper samples were produced on a laboratory and pilot scale. For this purpose, different coating colour components were used in combination with the same kind of base paper. The study included various types and amounts of pigments, binders and additives (defoamer, thickener, insolubilizer, anti-blocking agent). It was observed that application method, drying procedure and coating colour components can influence the surface tension value to a great extent. The interpretation of measuring results was problematic because a change in coating colour components causes also changes in porosity, roughness and structure of the coating layer. The penetration characteristics of the paper in contact with printing ink or water as well as the surface tension measured are influenced by changes in coating structure.

When using a corona treatment before printing the surface energy of the paper samples was enhanced irrespective of changes in the coating structure. A slightly improved printability was observed compared to the untreated samples. Fundamental statements could be made about the impact of surface tension, especially its polar part, on the printability of paper.

Application/Economic benefits

The quality of the print, often termed printability, in addition to the transportation of the paper through the printing press (runnability) are of utmost importance to the printer as far as his requirements and the quality of the paper to be printed are concerned.

The results compiled in this research project pertaining to the interactions between paper and printing ink characterise the effects different raw materials and additives used in coating colours have on the surface tension and printability of paper, as well as the positive influence of a conona treatment on the printing quality. This knowledge provides paper manufacturers and their suppliers with the support they need to arrive at an optimum selection of pigment and additives for offset printing paper.

Project period: 01.02.2005 – 31.01.2007

Remarks

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