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

Keywords:
Digital printing line, coated papers, electrostatics

Topic:
Optimisation of electrostatic properties to improve the runnability of coated papers in digital printing

Background/Problem area

For some years now, electrophotography-based printing systems together with finishing units – in the following termed digital printing lines – have been making inroads into markets formerly dominated by classical printing methods. In the case of one-colour prints, this includes the printing of brochures, paperback books, operating instructions and patient package inserts. The undeniable advantages, especially the high print quality and the elimination of traditional printing plates, together with the trend to smaller and high-quality editions within the next few years, will lead to a positive development of the market with noticeable growth rates.
The further development of this trend depends on the availability of adequate and low-cost papers with the required properties of printability and runnability. Especially in the field of graphic papers, which are used to produce high-quality products with classical printing methods, there is an extensive need for improvements in particular concerning runnability in digital printing lines. Due to the electrostatic charging of the papers during the print process there are – unlike uncoated papers - still residual charges on the paper web which disturbs or makes further conversion in the printing lines impossible.

Objective/Research results

The objective of the research project was to improve the runnability of coated papers in digital printing lines whose printing units operate according to the electrophotographic principle. In so doing, however, the printability in the printing lines and in offset printing was not to be in any way impaired. This objective was to be achieved by optimising the electrostatic properties of the paper coatings.
To achieve the above mentioned objective, ten commercially available offset and digital printing papers were examined to obtain in this way orientation values for the electrical and physical paper properties. Examination of the basic properties (electrical parameters and water absorbency) of nine base paper samples yielded base papers that were suitable for the coating trials. Successive trial series on a laboratory scale integrated special pigments, conducting salts, conductivity additives and humectants into a basic coating colour that was then applied to the selected base papers. Coating colour formulations for the pilot coater trials were defined on the basis of the determination of the electrical properties and water absorbency as well as an examination of the offset and laser printing suitability of the coated papers. The pilot coater trials also confirmed that the laboratory results could be scaled up to industrial practice. The coated paper reels were tested on a digital printing line with respect to the runnability, electrostatic charge and print quality (toner adhesion). An additional optimisation loop served to examine other conductivity additives that were subsequently applied by the pilot coater and then converted by a digital printing line. At the conclusion of the trials, papers/paper coatings were developed by adding a conducting salt (NaCl) and a choline chloride-based antistatic agent to a suitable coating colour. These papers/paper coatings were found to be capable of enhancing electrical conductivity whilst at the same time reducing the electrostatic charge on the paper surface. All in all, the electrostatic behaviour of the newly developed papers was significantly improved compared to commercial offset and digital printing papers that were also studied within the scope of the project. Moreover, it was also possible to confirm the offset and laser printing suitability of these papers.

Application/ Economic benefits

Digital printing is a printing method that is advancing into addition areas of print production due to its advantages. Due to increasing quality demands in conjunction with smaller print runs, it is expected that more and more high-quality products will be produced using this printing method. For this reason, a market segment which was formerly reserved for classical printing methods will become accessible for digital print.
The coating colours and papers developed in this project will supplement the innovative developments in device technology and significantly impact the markets, thus making an important contribution to the continued establishment of digital printing.

Project period: 01.02.2005 – 31.01.2007

Remarks

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