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Research area: Product aims

Paper, paperboard and board // Graphic papers

Key words:

Offset printing, dimensional stability

TITLE:

Modelling the dimensional behaviour of high-quality offset papers during printing

Background/Problem area

Press set-up times and the amounts of misprints produced at the start of printing could be greatly reduced in recent years. Nevertheless printers still need to save costs in order to remain competitive. Simultaneously, the quality demands on sheet-fed offset products have greatly increased. Customers expect highly accurate colour rendering as well as the precise reproduction of demanding printing subjects and technical elements. However, printing processes are still not free from critical effects: The paper substrate absorbs fountain solution and low-viscosity ink components during printing and has to withstand mechanical loads like tensile forces in MD and CD during each single pass through the various print units of the press. Especially in the case of large-size papers, this leads to significant dimensional changes in the printed sheet with various adverse effects on subsequent colour separations. The result is register differences in the print image.

Objectives/Research results

Register differences have been shown to result, among other, from unfavourable extension properties of the paper substrate due to liquid absorption into the paper surface. The project therefore aims to investigate extension processes during printing to elucidate dimensional changes caused especially by the offset printing of large-size sheets. For this purpose, the project has been subdivided into the following tasks:

Measuring major changes in mechanical paper properties caused by the effects of fountain solutions and printing inks - For this purpose, moisture-dependent elastic moduli and extension coefficients will be determined for each paper layer (base paper, coating layers), determining the structure of each layer after short-term moistening together with the resulting changes in physical properties. (These activities are finished already.)

Modelling length changes in multiple-coated art papers caused by moisture variations - Paper structures and their properties will be modelled by FEM to simulate the physical behaviour of the paper sheet. The results will also be used to identify critical parameters and requirements for improved and practically feasible paper structures.

Including the results of full-scale printing trials both in the parameterization of models and in the final comparison between model results and printing trials performed with improved paper substrates.

Application/Economic benefits

Envisaged result of the research project is the characterization of coatings and papers offering improved dimensional stability in industrial sheet-fed offset printing. This will increase the quality of sheet-fed offset products. Apart from time savings due to shorter set-up periods, this will enable cost savings through fewer misprints and higher machine availability. Another significant advantage of the improved papers is that printers will be able to print difficult subjects in high quality on both lower-grammage papers and larger sheet sizes after reduced set-up times.

Especially the improved runnability of large-size sheets could encourage smaller print shops to invest into equipment for larger and, thus, more economical print formats.

The project results can be expected to economically benefit mainly the printing sector, including also small and medium-size printers.

Period of time: 01.08.2011 – 31.07.2013

Remarks

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