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Research area: Product aims

Paper, paperboard and board // Graphic papers

Key words:

Inkjet printing, drying, modelling

TITLE:**Developing a simulation tool to characterize the drying behaviour of papers in high-speed inkjet presses****Background/Problem area**

The importance of inkjet printing has grown steadily in recent years, which is owed not only to the high flexibility offered by digital printing, but also to technical improvements enabling higher machine speeds and print heads covering the full web width. Inkjet printing is therefore an increasingly attractive option also for areas previously reserved for flexographic or off-set methods. Modern high-speed inkjet presses can be expected to produce several hundred pages of high-quality prints per minute on a multitude of substrates. Compared to conventional methods, the liquid volumes that must be absorbed by the paper and dried off ahead of the first idler roller to prevent ink set-off on machine components are much greater here. Drying is therefore already used in high-speed inkjet presses today, and will become ever more important the higher the printing speeds. A deeper understanding of the mechanisms involved in this process would help improve the design and print quality of high-speed inkjet presses - in terms of both economic results (energy and process efficiency) and product quality. For this purpose, the thermal properties of papers, coat layers, the various ink layers applied during printing as well as their resulting layer structures must be known.

Objectives/Research results

Aim of the project is to model the drying behaviour of papers and coat layers during printing. As a prerequisite, the thermal properties of papers and coatings must be understood and represented in models. Next step is the characterisation of drying properties, i.e. temperature and moisture distributions in the paper, during drying in the press. The envisaged final result is models forecasting theoretical optimisation options for the drying behaviour of papers and paper coatings in the press.

Application/Economic benefits

The heat transfer through paper plays an important part in both the production and many applications of coated papers, for example finishing or printing. In printing, the paper is heated to remove the moisture introduced by the process, i.e. a significant share of the absolute energy consumption for printing is spent on drying. Estimates suggest, however, that only around 2% of the drying energy is actually used for solvent evaporation, most of it is lost by heating the paper and various coat layers. Due to its high energy costs, drying offers vast potential for optimisation in terms of energy efficiency. The economic benefits of the project therefore result from two effects: energy savings due to higher energy and drying efficiency achieved by optimised paper characteristics and drying parameters, and improved product quality and productivity / runnability during printing due to fewer web breaks and paper jams. Moreover, papers with optimised drying properties will open up new market opportunities for paper producers in this highly competitive segment.

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Remarks

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