

**Research Institute:**

PTS Heidenau  
Pirnaer Straße 37  
01809 Heidenau

**Head of the research institute:**

Dr. F. Miletzky

**Project leader:**

Dr.-Ing. Rainer Klein  
Tel: 03529 / 551-686  
Fax: 03529 / 551-899  
E-Mail: [rainer.klein@ptspaper.de](mailto:rainer.klein@ptspaper.de)

Internet: [www.ptspaper.de](http://www.ptspaper.de)

**Research area: Product aims**

Paper, paperboard and board // Technical specialty papers

**Key words:**

Inkjet, ink setting, microporous, photographic paper

**Title: The setting behaviour of pigment and dyed inks in microporous layers****Background/Problem area**

Nowadays, inkjet printing employs a number of different printing principles such as continuous inkjet or drop-on-demand inkjet, thermal inkjet or piezoelectric inkjet methods. Dyed or pigment inks are used in these printing processes that for the most part are liquid.

The composition of inkjet printing inks depends on the printing principle and on the printer or ink manufacturer. Inkjet inks are low-viscosity liquids with viscosities ranging from  $\eta = 1$  to 30 mPa s. Dyes (with a molecular size of approx. 2 nm) and increasingly pigments (with a particle size of 50-150 nm) are being used. Depending on the type of method and printing substrate, a variety of carrier phases are used, although in most cases it is simply water.

Since the printing speeds of the latest generations of inkjet printers are constantly rising, the requirements placed on the speed of ink absorption of the inkjet paper is also moving upwards. The setting rates of current microporous inkjet paper will be superseded at the latest when printers using a page-wide printing head appear on the market.

**Objectives/Research results**

The research objective is to clarify the physical and physicochemical relationships which affect the speed of ink setting in microporous inkjet paper and to create models on the basis of such relationships. These models are to be subsequently used to develop recommendations and formulations for producing inkjet paper products with faster ink setting rates.

Suitable model papers and model inks were selected and characterised. Once sample formulations and laboratory processes had been worked out for the production of microporous inkjet papers, the ink setting rates of different papers produced in the laboratory were determined for use with dyed inks. It was found that the rate of ink absorption of dyed inks can be enhanced as follows:

- increasing the capillary radius of the pores,
- reducing the wetting angle between the ink receiving substrate and the ink
- reducing ink viscosity
- reducing the surface tension of ink
- dispensing with a barrier layer
- increasing the porosity of the ink receiving substrate

Using these findings a coating colour formulation for a microporous inkjet paper with improved ink setting rate was developed, optimised in lab scale and finally evaluated in a pilot trial. The print and paper quality characteristics of the produced microporous inkjet paper were similar to usual, commercial photo inkjet papers and additionally the ink setting rate for both dye and pigment inks was enhanced significantly.

**Application/Economic benefits**

German producers have a market share of high-quality coated inkjet paper that amounts to approx. 15 % and corresponds to about 22,500 t. Mills will only be able to increase their market share in future provided the paper quality meets the stringent requirements of the new generation of much faster printing presses. The prerequisite for this to happen, however, is to significantly increase the setting of the printing ink in the microporous receiving substrates. This is therefore the objective of the research project.

PTS will market the results of research achieved in the course of this project through its consultancy business for the introduction of new formulations. Another distribution channel is to integrate the results into concrete, customer-based contract research projects.

Introducing new formulations to potential users and further developing the pigments and binder systems is generally associated with trial days. The PTS pilot plant for innovative fibre upgrading and papermaking processes and the VESTRA pilot coater are to be used for this purpose.

The training of the engineers and technical personnel in paper mills and the supplier industry is part and parcel of PTS services. The results of the research project are also to be integrated into events relating to the coating and printing of paper as well as for the production of specialty papers.

**Project period: 01.05.2008 – 30.04.2010**

**Remarks**

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