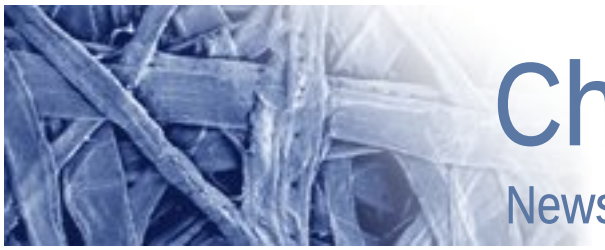


Characterisation

Newsletter

Number 01, January 2007

News from PFI:

PhD-Position within Fibre-Based Packaging

The Department of Chemical Engineering at NTNU has currently an open position for a PhD student in the area of fibre-based packaging within the project "Novel fibre-based water barrier packaging for transport of fresh fish and agricultural products" (FiBaPack). For further information please contact professor Øyvind Gregersen, (+47) 915 67 096, e-mail: oyvind.gregersen@chemeng.ntnu.no, or the project leader Marianne Lenes PFI, (+47) 73 55 09 93, e-mail: marianne.lenes@pfi.no.

New PhD within paper physics:

Siv. Ing. Øyvind Eriksen has defended his thesis entitled: "The influence of paper structure on ink pigment position and print-through". The defence of the thesis occurred on December 8, 2006. Øyvind Eriksen is now working as a Post Doc at PFI within the project: New Innovative Printing Paper grades.

During the last decades PFI has been working extensively with characterisation of fibre and paper. PFI has become one of the leading companies with respect to characterisation of fibre-based structures. Our close cooperation with the Paper and Fibre Technology group at NTNU and STFI-Packforsk will assure our customers a comprehensive availability of equipment and competence. Our intention is to aid the industry with the right tools for effective and detailed characterisation and quantification of fibre and paper properties. This yields the necessary information to evaluate pulp, paper and print quality, thus giving the opportunity to improve and add value to a given product.

As an attempt for continuing our efforts to aid the pulp and paper industry worldwide, PFI has created the Characterisation newsletter. Characterisation will be sent to our customers and colleagues twice a year, in January and August. The newsletter will contain information about most of our characterisation services, reporting the newest developed methods for quantification of relevant pulp and paper details. In addition, PFI news and summary of recent international publications related to characterisation and quantification of pulp and paper structure will be included for your information.

We really hope that this new initiative from PFI will be a new tool for keeping you informed and secure an effective knowledge transfer to our colleagues and customers.

Upcoming events

International paper physics conference
Gold Coast, Queensland Australia.
6-10 May 2007

COST E32 meeting:
Characterisation of paper surfaces for improved printing paper grades
Brasov, Romania
10-11 May 2007

Recommended links

COST E32 – characterisation of paper surfaces:
www.pfi.no/gary/COSTE32.htm
PFI services:
www.pfi.no/contract/contract.htm
STFI-Packforsk:
www.stfi.se

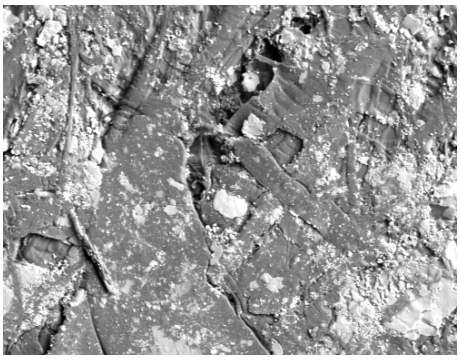
Next number, August 2007

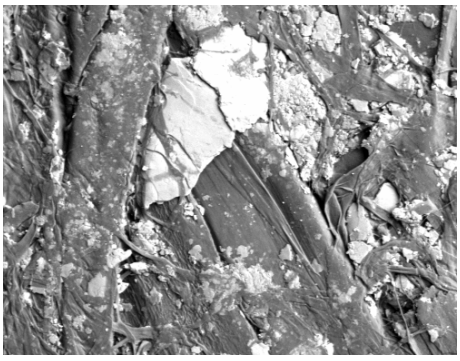
-Newsprints: structure and print-through

Selected analysis method

Surface filler characteristic details are assessed by image processing and analysis of high resolution SEM images. The 3D surface structure is assessed.

High-resolution SEM Surface analysis of SC papers





Practical applications

- Quantify the fraction of filler particles on the paper surface
- Quantify the effect of filler particles on the paper surface optical properties
- Assess the development of the surface structure due to different calendering conditions

Editor

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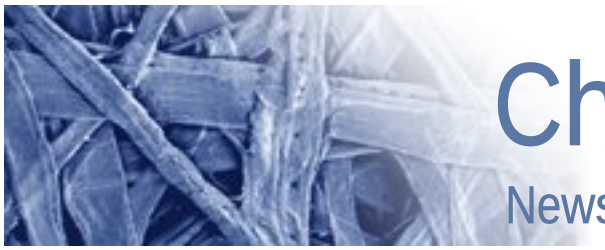


Characterisation Newsletter

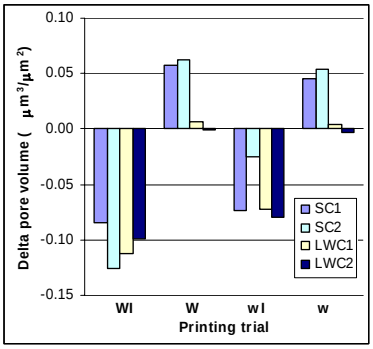
Number 01, January 2007

Assessing roughening effects on printing paper

On the roughening effect of laboratory heat set offset printing on SC and LWC paper surfaces

Abstract

The structural effects of water and ink application on the paper surface during laboratory heat set offset printing are presented. The roughening effect of water is clear on SC paper while no significant effect was detected on LWC paper surfaces. Although the ink levels the micro-surface of both SC and LWC paper, the macro-surface structure of SC paper suffered a considerable roughening due to the water application. Both the surface pore volume and the facet orientation are suitable parameters for characterising the surface structure affected by the ink. The facet orientation is also a most relevant parameter for estimating the gloss level of paper and prints. The variation of such facet orientations may also give a suitable prediction of the paper surface gloss variation. Based on this assumption, it was found that the local gloss variation of LWC paper decreases after printing. The opposite effect was found on SC paper, although the gloss level increases for both paper grades.



The quantification of the surface pore volume, based on laser profilometry, shows the smoothing and roughening effect of ink and water respectively. In every printing trial where printing ink was used (trial WI and wI) the surface pore volume was reduced. This indicates a smoothing of the surface micro-structure due to the printing ink.

Application of water causes a roughening of the surface structure for SC papers. No effect was detected for LWC papers. Reproduced from Chinga et al. 2004.

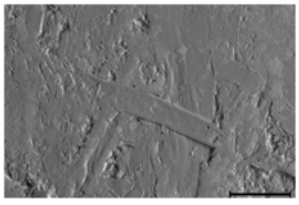
Reference: Chinga, G., Stoen, T. and Gregersen, Ø.: "On the roughening effect of laboratory heatset offset printing on SC and LWC paper surfaces". Journal of Pulp and Paper Science 30(11): 307-311 (2004).

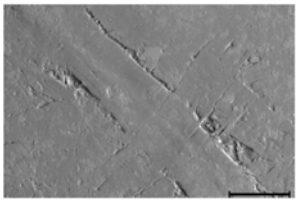
Effects of temperature gradient multi-nip calendering on SC paper

Effect of temperature gradient multi-nip calendering on the structure of SC paper

Abstract

In order to analyze the effect of temperature gradient calendering on base paper for SCA/A+ quality, an image analysis method was applied on cross-sectional images to measure density distribution in the paper's z-direction. The analysis proved the existence of density gradients. However the observed gradients appeared to be introduced in the forming section, not by the calendering. Although the density gradient development could not be observed when dividing the structure into layers thinner than a collapsed softwood fiber, there was a clear development of the surface gloss. This means that the development of the surface must be concentrated to the very few outermost microns of the paper structure. The increase of the gloss at raised thermo roll surface temperatures could mostly be explained by increased area of horizontally orientated micro surfaces, so called facets, in surface topography images. Assessment of the surface topography distributions also shows a larger ability for elevated thermo roll temperature than elevated line load for reducing the macro-scale roughness. The reduction of roughness is caused by compression of the surface peaks, increasing gloss and reducing the depth of the surface valleys.





Left: Surface topography of paper sample calendered at 100 °C and 240 kN/m. Right: Surface topography of paper sample calendered at 150°C and 370 kN/m. Bar = 50 µm. Reproduced from Holmstad et al. 2004.

Reference: Holmstad, R., Kure, K.-A., Chinga, G. and Gregersen, Ø.: "Effect of temperature gradient multi-nip calendering on the structure of SC paper". Nordic pulp and paper research J. 19(4): 489-494 (2004)

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