

Characterisation

Newsletter

Number 03, January 2008

News from PFI:

New research scientist: Eva-Lena Hult Mori started as research scientist at PFI in October 2007 within the field of new biobased materials. Eva-Lena earned her Ph.D. in pulp and paper technology from the Royal Institute of Technology in 2001.

New projects:

- SustainBarrier: Fibre based packaging materials: development of innovative and sustainable barrier concepts
- STEM: Nanosized cellulose fibrils as stabilizers of emulsions
- Partner in WoodWisdom Net project WoodFibre3D: Structure-property relations of wood fibres: 3D characterization and modeling
- Partner in EU-project SustainComp: Development of sustainable composite materials

New PhD-students:

- Klodian Xhanari: use of cellulose microfibrils for stabilizing emulsions.
- Mihaela Tanase: removal and separation of wood resin in mechanical pulping.
- Dmitri Gorski: the effect of chemicals and enzymes on the energy consumption in mechanical pulping.
- Sofia Enberg: darkening reactions of mechanical pulp.

Print quality

Print quality can be defined in several ways, depending on the paper grade or the printing process involved. For SC paper, the surface topography and the surface compressibility play essential roles in rotogravure printing. The print quality of LWC paper may depend on the coating layer structure, which may control the ink-setting and influence print quality parameters like mottling or print gloss in heatset offset printing.

The definition of print quality in newsprint may involve the quantification of print-through, set-off, ink coverage and aspects related to linting. In this issue we have focused on the characterisation of picking and lint particles. Picking is defined as the removal of paper fragments from its surface during papermaking or printing. Picking affects the print quality by creating unprinted spots on a printed image. In addition picking also increases lint build-up in a printing unit, which causes unnecessary costs for a printing house. It is thus important to control the picking tendency of a paper sample. Adequate characterisation methods for a proper quantification of picking are thus necessary. Such methods have been developed at PFI, offering a good opportunity to quantify the picking degree of a given sample and, most importantly, the structural causes of picking.

Upcoming events

FPIRC course:

Paper Surfaces - Printability and Print Quality. April 22-25, 2008, Stockholm.
<http://www.fpirc.kth.se/courselist>

PaperCon '08 :

May 4-7, Dallas, TX.
<http://www.tappi.org>

2008 Progress in paper physics seminar:

June 2-5, Espoo, Finland.
<http://www.tkk.fi/Units/Paper/paperphysics08/index.html>

Recommended links

PFI services:

www.pfi.no/contract/contract.htm

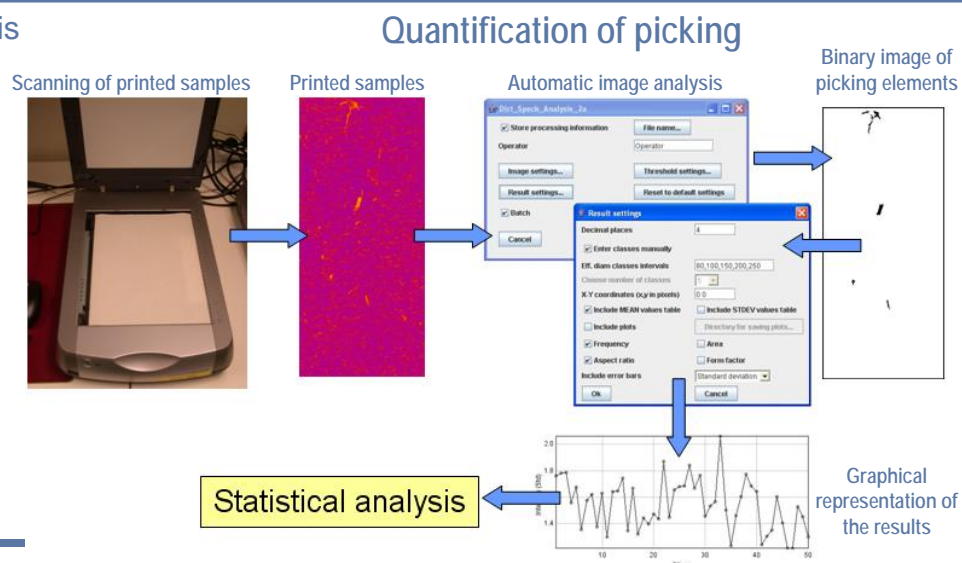
STFI-Packforsk:

www.stfi.se

Next issue, August 2008

- Fibre and paper cross-sectional analysis

Selected analysis method



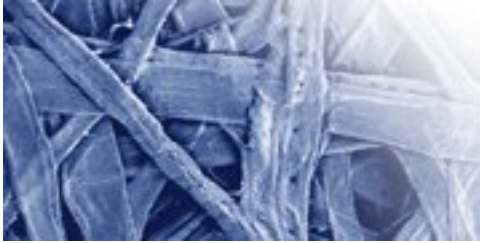
Editor

Contact: Dr. ing. Gary Chinga
 Postal address: PFI, N-7491 Trondheim, Norway
 Email: gary.chinga@pfi.no
 Phone: +47 73550925
 Fax: +47 73550999

Papir- og fiberinstituttet AS
 Paper and Fibre Research Institute

PFI





Characterisation

Newsletter

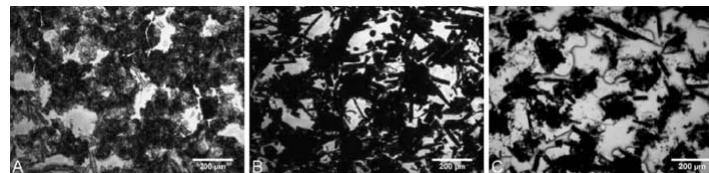
Number 03, January 2008

Analysis of lint particles

Analysis of lint particles from full-scale printing trials

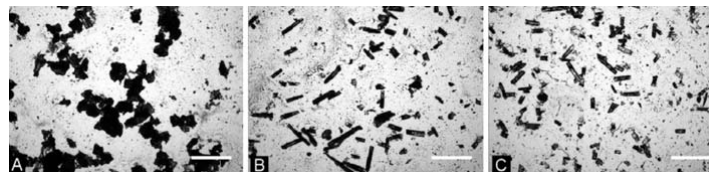
Abstract

The present study describes and demonstrates an improved method for acquiring tape pulls, preparing samples from the tape pulls for light microscopy analyses and quantifying lint particle details. The quantification was performed on non-image areas, image areas in black printing unit and non-image areas in yellow printing unit where the paper had been printed in black (back-trap lint). Non-image areas were characterized by having a large fraction of filler particles. The particles/agglomerates were rounded and had low aspect ratio. Image areas in black printing unit and non-image areas in yellow printing unit previously printed in black, had a large fraction of fibre material. The method seems suitable for quantifying lint amounts and for characterizing lint particle details like shape and size.



Images acquired directly from tape pulls. A) Non image area. B) Image area, black printing. C) Back-trap lint. Bar = 200 µm.

Reference: Syverud, K., Chinga, G., Johnsen, P.O., Leirset, I. and Wiik, K.: "Analysis of lint particles from full-scale printing trials". *Appita J.* 60(4): 286-290 (2007).



Images of lint particles. The samples have been prepared by dissolving and diluting the particles on microscopy slides. A) Non image area. B) Image area, black printing. C) Back-trap lint. Bar = 200 µm.

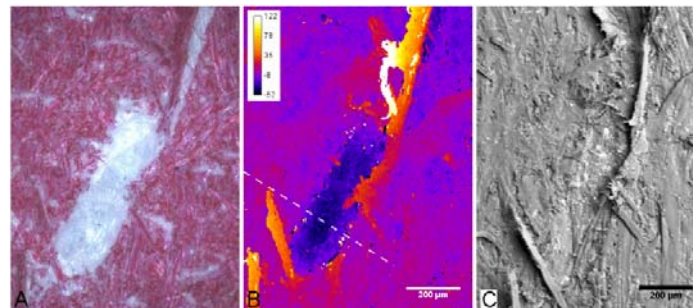
Reproduced from Syverud et al. (2007).

Quantification of picking areas

Quantification of paper mass distributions within local picking areas

Abstract

The study introduces a new method to analyze paper structure and local print details. The method is described in detail and is based on advanced and recently developed image analysis algorithms. Simultaneous image alignment allows assessment of the local paper structure affecting a given print detail. A cross-correlation analysis between optical and β -formation images is performed with a new developed routine. The influence of formation on picking is assessed. Based on β -formation analysis, the present study reveals that picking occurs mostly on areas with high basis weight. It seems, however, that optical formation is not suitable for assessing the local formation characteristics affecting picking. The method seems also suitable for assessing the local characteristics of several paper and print relationships.



A) Local light microscopy image of the magenta-printed sample. The white area corresponds to a surface cavity where a surface element has been picked up. B) Topography image of the same local region. C) A corresponding SEM image acquired in secondary electron mode.

Reproduced from Chinga and Syverud (2007).

Reference: Chinga, G. and Syverud, K.: "Quantification of paper mass distributions within local picking areas". *Nordic Pulp Paper Res. J.* 22(4): 441-446 (2007).

Contact Address

Postal address: PFI, N-7491 Trondheim, Norway
 Telephone/fax: +47 73 55 09 00/ +47 73 55 09 99
 e-mail: firmapost@pfi.no
 Internet: www.pfi.no

Papir- og fiberinstituttet AS
 Paper and Fibre Research Institute

