

# FPC News

A white motorboat is positioned in the center of a pond, surrounded by lily pads and reeds. The boat is slightly tilted, and its reflection is visible in the water. The background is a dense thicket of reeds and grasses, creating a natural, serene setting.

Spring • 2010

**Services of many kinds  
for the forest industry**

**Now available from FPC:**

## **Multilayer curtain coating pilot trials**

**Understanding the papermaking  
value chain to obtain superior  
coating and printing performance**

**| Editorial |**

## Something new, something old, something green

**A**fter a long, cold, and snowy winter spring is finally here! For me spring is the most exciting time of the year. New things are coming out and growing in the beautiful nature, but also some old and familiar things are returning like the birds that have spent their winter somewhere warm (lucky them!). Spring at FPC and in the forest industry in general is quite similar to the spring seen outdoors. New things are emerging; new types of materials and new products are being developed. The forest industry has awoken to the fact that the industry is permanently changing, and it has reacted to this change. This change can also be seen at FPC. After some minor changes on paper machines traditional pilot coating trials

have decreased significantly. Nowadays, a lot of pilot trials are part of a bigger development project. Another increasing trial type is regularly done print quality monitoring; these trials are nothing new at FPC, but they seem to be increasing after a slow season. These facts tell us that the forest industry is putting an effort into developing their products to be more competitive and alluring for their customers. Customers on the other hand are very strict about the quality of the product, so the paper industry is forced to pay strong attention to it in their efforts to compete with other media and materials.

Spring also brings something old and something new to FPC. The PulPaper fair will again be held at the beginning of June for the first time in three years. You can meet us at the

PulPaper 2010 fair at Helsinki Fair Centre on June 1-3. Please visit our stand 6f51! At the fair we will introduce new project proposals together with Innventia Ab (the former STFI). You can read more about these proposals in this magazine. We will also have something completely new at FPC this spring. In this issue we present the new curtain coating pilot trial possibilities that we offer in cooperation with Metso Oyj. The first pilot trials will be realized before the summer holidays. Another new service offered by FPC is packaging gravure pilot trials in cooperation with A&R Carton in Kauttua. By following our web pages at [www.fpc.fi](http://www.fpc.fi), you'll get first hand information about our new services. 🌱

*Hopefully we'll see many of you at PulPaper. Enjoy your spring!*

Jenni Anjala



**Customers are very strict about the quality of the product, so the paper industry is forced to pay strong attention to it in their efforts to compete with other media and materials.**

## Services of many kinds for the forest industry

**F**PC offers a variety of different services for the forest industry. Some of these services are familiar and widely known, but others may be less known to our customers. Here we introduce our services, concentrating on those which are perhaps less familiar. FPC provides services for the paper, printing and packaging value chains. The service concept covers all stages of paper manufacture, from base paper through coating and calendering to final printed end products and packages.

FPC has a well-equipped coating color kitchen, which offers precise dosing of raw materials and optimal mixing technology. Various types of trials, such as the evaluation of different coating color recipes, their effect on runnability and paper properties, and the comparison of different coating or drying methods can be

the several different running modes of the calender, calendering for matt, silk and glossy paper grades can be covered with one calender.

Printing possibilities at FPC include heatset web offset, sheet fed offset, and flexo. The flexo printing is operated in the varnishing unit of the sheet fed offset machine. So it's possible to run 1-colour flexo with water based or UV flexo inks. The method is excellent for print quality monitoring. FPC also offers digital printing trial possibilities. The inkjet machine is located at Hansaprint in Turku, and the electrophotography machine in Vantaa. FPC offers various finishing machines, including electrocreaser and crossfolder. Both can be used to study folder cracking. They also suit-

able for small scale manufacturing. FPC has both a saddle stitcher and a hot melt book binder. They are also suitable for testing purposes as well as small scale manufacturing.

FPC also offers training related to coating and printing methods. At FPC we can offer first class theoretical and practical training by printing and coating professionals. We can customize the training package flexibly to suit the needs of the customer. It's possible to have a general training session related to coating and/or printing, or we can concentrate on a specific phenomenon. If you want to know more about our training possibilities or have a specific need for training, please contact R&D Engineer Jenni Anjala ([jenni.anjala@fpc.fi](mailto:jenni.anjala@fpc.fi)). 🌱

**FPC also offers digital printing trial possibilities.**



Now available from FPC:

# Multilayer curtain coating pilot trials



**Have you ever considered the interesting opportunities that innovative multilayer curtain coating technology can give to your product? It seems that many of our customers have, because they have frequently inquired about such a pilot trial service. FPC is now proud to include this revolutionary coating method in its offerings.**

In December 2009, FPC signed a cooperation agreement with Metso, a world leader in paper machine technology, for multilayer curtain coating pilot trials. These trials are carried out in Metso's

modern Surface Treatment Technology Center in Järvenpää, Finland. FPC will be responsible for practical trial arrangements, such as contacts to Metso and orders of the needed raw materials. Also, a member of our staff will be present at the trials.

**With this solution, it is possible to replace traditional polyethylene coating.**

Our customers – papermakers, boardmakers, chemical suppliers and research institutes – now have access to state-of-the-art pilot curtain coater machinery and a great opportunity to gain major benefits in their own production and processes.

“Pilot trials provide the customers’ R&D staff with a highly useful tool to develop different kinds of new products with new functionalities, especially in the range of specialty papers and packaging materials,” describes **Timo Nurmiainen**, R&D Project Manager at Metso, one of the developers of the OptiLayer technology.

**Customized surface properties, fine-tuned functionalities**



Timo Nurmiainen

Multilayer curtain coating technology was developed by Metso in close cooperation with the coating formulation supplier Dow Chemical. The target was to be able to better meet the paper and boardmakers’ needs for improved and tailored surface properties.

In this high-solids-content process, a curtain coater applies several extremely thin and uniform layers simultaneously on the web through one coating station in a clean, quiet, non-contact operation. The coverage is excellent.

By applying more than one layer, the paper or board grade’s surface properties can be customized by fine-

tuning the functionalities of the different layers in a cost-efficient way. It is possible to use lower-cost furnish and optimize the use of expensive coating ingredients, without compromising on surface properties. After all, it is the general trend in papermaking to lower raw material costs by using increasing amounts of recycled fiber, while increasing end-product quality and decreasing operating costs.

**Excellent results with specialty papers and board grades**

This coating technology was introduced a few years ago, first for thermal paper and then for 100% OCC-based liner, which was converted into white top liner.

“In both of these cases, the companies have used the technology to develop products, processes and functionalities that have helped to keep them a step, and presumably many steps, ahead of the competition,” Nurmiainen points out.

**By applying more than one layer, the paper or board grade’s surface properties can be customized by fine-tuning the functionalities of the different layers in a cost-efficient way**

Due to extremely positive experiences gained so far, the technology offers excellent opportunities for other specialty papers and board grades, too. Coated board, for example, which often uses airknife coating, could significantly benefit from

the curtain coating method. After all, airknife coating has low efficiency due to inherent runnability and speed limitations, as well as other problems such as noise, mist and coating reclaim. Curtain coating technology, in turn, provides the same or better coating coverage as an airknife in a faster, cleaner, quieter and more energy-efficient operation.

“Another suitable application is for food packaging board. By using barrier coating in one of the three layers, it is possible to add to the grease- or water-repellent capabilities of the product. With this solution, it is possible to replace traditional polyethylene coating,” Nurmiainen continues.

High-quality inkjet photo paper is a grade that could benefit from the multilayer curtain coating technology, as well.

A wide range of dry solids and coating thickness options available

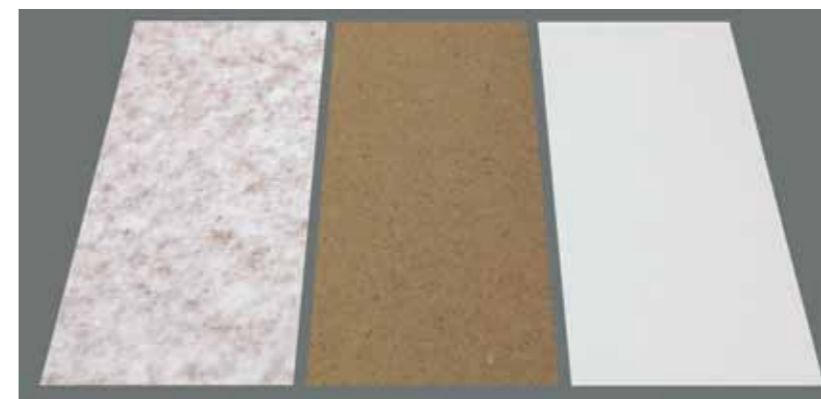
Metso’s Surface Treatment Technology Center in Järvenpää offers the

best available equipment, facilities and staff for carrying out multilayer curtain coating pilot trials with up to three layers.

The multilayer curtain pilot coating station is installed in the OptiCoater pilot coater, suitable for running grades in the basis range from 30 to 300 g/m<sup>2</sup>. Coating is applied in the range of 2-35 g/m<sup>2</sup> at speeds of 100 to 3,000 m/min. The web width is 550 mm.

“We operate in a wide solids content range from 10 to 70%. Our drying capacity is good, allowing an excellent testing ground for various drying strategies,” Nurmiainen adds.

The center also houses a pilot coating kitchen and supply systems as well as a well-equipped laboratory that can be used in connection with the pilot trials. ❖



From the left: three times blade coated sample (13 + 9 + 10 = 32 g/m<sup>2</sup>), base paper, OptiLayer curtain coated sample (10 + 6 = 16 g/m<sup>2</sup>).

# Understanding the papermaking value chain to obtain superior coating and printing performance

The collaboration between FPC Oy and Innventia AB was established about a year ago in order to be able to offer pilot services for the forest based industries. By covering the whole production chain unique services

for the paper and printing industry are provided. The main strengths in this kind of consortia are the flexibility and controlled way of changing process parameters and process conditions. Different process variables can be changed rap-

idly, and with small amounts of raw materials one is able to study paper machine / coater runnability and printability problems in a cost-efficient way. Concrete trials have already been performed, mainly concentrating on the filler level of

## Project goal

Reduce cost with novel compositions

### Idea

Unique possibility to evaluate

- New fibre raw material e.g. eucalyptus, acacia, and straw for printing papers and board products
- Increased filler loadings in the paper
- Novel raw materials for papers

### Printing related issues caused by vessel and parenkyma cells from the paper/board

Vessel cells are present in different fibrous raw materials. Eucalyptus, which is one of the most widely used hardwoods, has vessel cells which are quite small in number but large in size. Vessel cells which are not strongly bonded to the paper surface are picked up by the rubber blanket, circulated in the printing units and then finally re-deposited on the paper. Vessel and parenkyma cell defects spoil the paper quality and there is a need to increase knowledge on how to predict and counter these problems.

By removal or addition of these cells in the paper, together with studying inks with e.g. different tackiness level,

obtaining online information about moisture levels and studying different roughness levels of printing plates and rubber blankets, valuable information related to e.g. piling in the printing process is obtained.



## Project goal

Efficient raw material usage and improved quality

### Idea

Unique possibility to systematically vary the

- Base paper formation (Change polymer dosage, modify fibre ratio, etc.)
- Base paper sizing
- Filler loading

### New printing grades based on novel compositions

Eucalyptus and acacia pulps are raw materials for the manufacture of several grades of papers. For each paper grade there are different requirements for the pulp quality. The requirements are also machine specific which concludes that no universal pulp exists which performs well on every paper machine.

The interest in eucalyptus pulps in papermaking is increasing due to the specific properties they impart on paper such as bulk, reasonable opacity, formation, and porosity. Acacia, on the other hand, provides pulp with a high density of very short fibres, resulting in high smoothness and very high opacity, together with high brightness and whiteness.

the base sheet and its influence on coater runnability and printing performance.

Ideas and planned joint activities between Innventia and FPC, to further strengthen synergies between pilot facilities in the Nordic countries and collaboration between the players in the forest industry sector are now being published. The innovation and development projects will be run in close cooperation with the industry.

The main strengths are the flexibility and controlled way of changing process parameters and process conditions.

## Base paper properties and influence on coating and printing performance

Today's paper manufacturers operate under increasing financial pressure. There is a need to reduce costs, and one potential way is by replacing fibre with fillers. Replacing base paper fibres with different filler types will have a significant effect on the roughness, strength properties, and bulk. Reductions in costs can only be achieved by understanding the different filler types and loading levels, and how these affect the balance of key base paper properties. ::

See you at the PulPaper exhibition 1-3 June 2010, our stand number is 6f51.



## Contact us for more detailed information.

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## Project goal

Improved product quality and runnability in the printing process

### Idea

Unique possibility for

- Fractionation of vessels/parenkyma cells in the paper
- Addition of vessels/parenkyma in the paper
- Vary inks, moisture, plates and rubber blankets etc

### Printing related issues- strength properties

During printing, converting and post processing of paper, the material is often subjected to complex dynamic processes. The mechanical stresses occurring in offset printing may lead to delamination of the sheet, especially as the speeds in manufacturing and printing increases.

The uniaxial stress gradients may lead to fibre bonding failures due to failures in the interface between the coating layer and the fibre network or due to removal of fragments from the coating layer.



## Project goal

Improve runnability in the printing process

### Idea

Unique possibility for strength evaluation

- Z-strength by changing formation
- MD strength by varying anisotropy, furnish, chemical composition etc
- Increased surface strength by stratified forming

The trials are carried out by base-paper production on the FEX paper machine at Innventia AB. The coating, calendering and printing trials are carried out at Forest Pilot Center Oy.

The contacted industrial partners include board and paper producers and chemical suppliers to the paper industry.

Innventia and FPC are now seeking partners who are interested in all, or some of the project proposals presented.

