



## Energy to be saved on recycled paper

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# Public financiers for a stable basis



The role of STFI-Packforsk is to be a bridge spanning science and the operations of its customers. For that bridge, two stable foundations are necessary; one at the customer's and his business activities and the other well anchored in academic research. The latter implies the existence of operations whose main aim is to develop new expertise and to be integrated into a world-wide researcher network.

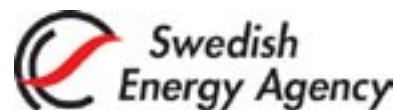
There must also be room to test and evaluate new ideas. Ideas, which one cannot exactly predict where they are leading to, in the beginning and, even less, to see the financial benefits within a foreseeable future. It is here that the public financiers enter the scene, to guarantee that the virtual long-range developments are being directed in a propitious direction.

For public funding of its projects, STFI-Packforsk is always in strong competition with universities and other technical institutes. Public grants represent between

30% and 40% of the total turnover of STFI-Packforsk. This comes, for the most part, from the Swedish Government, represented mainly by VINNOVA and the Swedish Energy Agency and then from the EU. This funding strengthens the possibility of STFI-Packforsk taking part in international research networks. In this way, the Company will always be able to match itself against the major research organisations in different areas and so this guarantees that its own operations are up there with international research.

"The networks provide a very good general view of the know-how and expertise in our field of activities in the world, which is a very valuable asset, not least, when it comes to our customers," says Helena Vollmer, Marketing Co-ordinator at STFI-Packforsk. ●

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## STFI-Packforsk ska fungera

som en bro mellan vetenskapen och den verksamhet kunderna bedriver. I bolaget måste det därför finnas verksamhet vars främsta syfte är att bygga upp ny kompetens och att ingå i världsomspännande forskarnätverk. Det måste också finnas utrymme för att testa och utvärdera nya idéer. Här kommer ofta de offentliga finanssägarna in för att borga för att den riktigt långsiktiga utvecklingen löper i en gynnsam riktning.

De offentliga anslagen står för mellan 30 och 40 % av STFI-Packforsks totala omsättning och kommer till största delen från svenska staten, främst Vinnova och Energimyndigheten, och från EU.



## What's in the basket?

Advanced technology and new materials have made it possible to develop and expand the variety of packaging, particularly when it comes to consumer goods. At the same time, the EU Packaging Directive is putting pressure on its member countries to reduce the amount of

packaging material. But what or who is it that actually controls the development of packaging in Europe? The European Shopping Basket, a newly begun three year project, will collect and process data that will hopefully provide the answers.

The Shopping Basket will comprise the 100 commonest purchased products in the country. The collecting will occur on two occasions, in a representative selection of European countries, viz. Estonia, Finland, Italy, Poland and Great Britain, where each country will have its own Shopping Basket. The information will be entered into a database that makes it possible to work with the data in many ways and observe the development of packaging from various aspects. The project will work with traditional business ratios and key social values.

"We would like to show that there are more things than directives that control developments," says Beatrice B. Johansson, who is responsible for this project.

As an example, she mentions the differences in consumers' life-style, ages, behaviour and preferences, but also that there could be other driving forces, such as availability of raw materials or places where the selling takes place. In some countries, it may be more common to shop at a market than a store, where there is more of a demand for packaging.

"Using the database, we will be able to produce statistics that will facilitate

a judicious discussion among legislators, environmental organisations and the industry," remarks Beatrice.

The project is being run by Europen, which is a trade organisation for the packaging industry in Europe, and STFI-Packforsk. The companies that are financing the project have built a Technical Working Committee. Representatives from the European Commission and various environmental and trade organisations have also been invited to join a Stakeholder Committee. ●

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## The European Shopping

**Baskets** är ett nystartat projekt som under en treårsperiod ska samla in och bearbeta data om varukorgar bestående av de 100 vanligast köpta produkterna inom landet. Insamlingarna görs vid två tillfällen från ett representativt urval av länder inom Europa: Estland, Finland, Italien, Polen och Storbritannien. Alla uppgifter läggs i en databas som möjliggör laborering av data på olika sätt. I projektet kommer man att arbeta både med traditionella nyckeltal och "social key values".

– Vi vill visa att det är mycket annat än direktiv som styr utvecklingen, säger Beatrice B. Johansson, en av de ansvariga för projektet som styrs av branschorganisationen Europen och STFI-Packforsk.



# Rush to this summer's Paper Symposium!

STFI-Packforsk is organising The 6th International Paper and Coating Chemistry Symposium to be held jointly in June with the Royal Institute of Technology (KTH) and the Institute for Surface Chemistry (YKI). This three day Symposium in Stockholm will be a meeting place for the world of research as well as industry, with a major part of it being lectures from the front line of research.

Make paper stronger – utilise the properties of microfibrils

In a lecture, Mikael Ankerfors is going to talk about the production of microfibrillated cellulose.

“A paper fibre receives its strength and stiffness from crystalline cellulose that is arranged in long rods with a square cross section called microfibrils,” comments Mikael.

“If these are loosened, their stiffness and strength can be utilised in a better way, which means that they can improve different products properties. Sadly, it isn't that easy to lay them bare, but methods do exist,” he adds.

“The freed microfibrils can be used, for example, as a dry-strength agent, a surface strength agent, a nano coating of paper, or in the really latest thing these days, nano composites.

“In principal, crystalline cellulose is as strong and stiff as Kevlar®. The advantage is that cellulose is recyclable and that its price is competitive. The problem is that it's not easy to obtain a homogeneous composite material, when large particles like paper fibres are used. But microfibril cellulose, which is merely a fraction in size, is a good deal easier to mix in homogeneously. There is more surface per weight, which increases interaction with plastic and improves strength properties markedly.”

Microfibrillated cellulose was first produced in the beginning of the 1980s but it was a dear and energy-intensive process. STFI-Packforsk has now developed a method of production that works very well technically and with an energy consumption that falls well below previously reported results. It now requires even less energy than the production of newsprint does.



Mikael Ankerfors and Lars Sjöström are two of STFI-Packforsk contributors at the symposium in June.

“Our aim now is to find a killer application and then scale-up production,” states Mikael.

Reduce impurities in white water

The Effects of Released Organic Substances on Sizing Efficiency is the title of another contribution to the Symposium. Lars Sjöström has a long history of experience with applied paper chemistry and he will present a paper on the substances in white water that interfere with the sizing of paper.

To obtain a high-quality print, the fibres must be made hydrophobic, glued, and the paper given properties that match the printing ink, so that the fibres do not absorb the ink too much.

“Otherwise it will resemble writing on a serviette with ink,” comments Lars.


“Today, paper mills are aiming more and more at closed systems, which leads to an accumulation of impurities in the white water. And the greater the concentration, the more sizing chemicals have to be used, to get an even and excellent paper quality that will give the desired print quality. An increase in the concentration of impurities results in a decrease in process efficiency and the costs then go up.”

“And when mills use new kinds of pulps, it means that new types of impurities will enter the processes.”

Research into these aspects has been going on for several years at STFI-Packforsk and several paper mills have supported these efforts, so that they can supply their customers with high quality products.●

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 **1 juni arrangeras** The 6th International Paper and Coating Chemistry Symposium. Symposiet i Stockholm blir mötesplats för såväl forskarvärlden som industrinäringen med ett stort antal föredrag från forskningsfronten.

Ett föredrag av Mikael Ankerfors handlar om tillverkning av mikro fibrillär cellulosa. En pappersfiber får sin styrka och styvhet från kristallin cellulosa som är organiserad i långa stavar med kvadratisk tvärsnitt, så kallade mikro fibriller. Om dessa friläggs kan deras styvhet och styrka utnyttjas bättre och mikro fibrillerna kan användas tex. i nanokompositer.

Lars Sjöström kommer att tala om de substanser i bakvattenssystemen som stör limningen av papperet. För att få ett bra tryck måste fibrerna hydrofobas, limmas, så att papperet får egenskaper som passar ihop med tryckfärgen så att inte fibrerna suger åt sig tryckfärgen för mycket.



Anna Jacobs is project manager for the Recycled Fibres cluster:



Norske Skogn in Norway is one of the largest newsprint mills in Europe.



PHOTO: NORSKE SKOG

# Recycled fibres undergo fibre wall analysis

In pace with an increase in the use of recycled fibres and the collecting of paper, there are fears that the quality of recycled paper will deteriorate. Each time a paper is recycled, the properties in its fibres lose something in size, strength etc.

The foundation for a newly started Cluster called Characterisation and Fibre Properties of Recycled Fibres is a need for a better understanding of the processes. Research is taking place in close co-operation with three large users of recycled fibres. They are, namely, Norske Skog, a newsprint producer, Peterson, a big producer of tube-roll board, and Klabin, making test liner for corrugated board.

"We have created a niche for our research in areas that have not been covered by other research," says Anna Jacobs, the Project Manager.

"We want to know, for example, what is happening on the fibre level. Many of the properties are dependent on the fibre walls and it's very important to know by how much these properties are affected in the recycling process. With such knowledge at hand, it will be easier to install measures for raising the quality, whenever it's necessary."

One increasing problem is that the components that are unwanted in the new, recycled-based paper come with the recycled paper in the processes. They might be, for example, various printing inks, glue or simply pollutants that have occurred during the first life-cycle of the paper. In addition, the raw material in recycled paper is comprised of fibres resulting from different types of production processes, e.g. from chemical or mechanical pulp production, with the various fibre properties belonging to them. A part of the research efforts therefore consists of producing methods for identifying what the recycled pulp contains. Apart from additives, this means making a survey of the different kinds of fibres that the pulp consists of.

"Owing to our many years of research in the areas of pulp and paper production, we have our own advanced methods for analysing virgin fibres. We can now apply these methods to our work with recycled fibres and this means accuracy and speedier results."

"In this special project, we have been able to utilise the recycled pulp from the participating mills. This gives an extra return to the Cluster participants. I think the most interesting thing is coupling the properties of the fibres with those of the end products."

This research project was started in the second half of 2005, and will continue until 2007. ●

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**Ett behov** att bättre förstå processerna vid fiberåtervinning är bakgrunden till det nystartade clustret Characterisation and Fibre Properties of Recycled Fibres. I takt med ökad användning av returfiber och insamling av papper befarar man att kvaliteten på returpapper kommer att försämrats. För varje gång papperet återvinns tappar fibrerna i storlek, styrka och andra egenskaper.

Forskningen är nischad mot vad som händer på fibernivå. Mycket av egenskaperna sitter i fiberväggarna, och det är viktigt att veta hur de påverkas av returprocessen. Metoder för att bestämma vad som finns i returmassan kommer att tas fram. Det innebär att kartlägga, förutom tillsatsämnen, vilka olika typer av fibrer massan består av.

Forskningen sker i nära samarbete med Norske Skog, Peterson och Klabin.

## Fibre knowledge throughout the entire process

"The most interesting thing about the cluster Characterisation and Fibre Properties of Recycled Fibres, is that it is dealing with an understanding of fibres," says Aanon Røring, a De-inking Process Technology specialist at Norske Skog. He is of the opinion that this project differs from other research projects at technical institutes, where many of the projects concentrate more on the purity of the pulp in the form, for example, of stickies and stains, DIP (De-inked Pulp), the brightness of the pulp and its other optical properties, together with the removal of print ink.



"This particular project is more aimed at the types of fibres we have in our processes and what happens to those fibres during the process," continues Aanon Røring. "We are aware that a raw material will have a different composition, depending on where it is collected, and this can mean large deviations in the production. So, in this project, we are going to be able to follow the entire chain, from the fibre to the final product and how we should treat the fibres in order to attain the best utilisation of the properties of the fibres."

He is looking forward to this project providing Norske Skog with a deeper knowledge about how to follow the fibres in the process and then control the process, based on the composition of those fibres. ●



# Energy to be saved on recycled paper

It is feasible to save large amounts of energy when treating recycled paper. An interesting technique for more efficient slushing is currently being evaluated, in collaboration with, among others, Läckeby Water Group, JLR Pulping, a technical development company and STFI-Packforsk. The project has the support of STEM, the Swedish Energy Agency.

Guest contributor: Nils Lindstrand

“The idea behind this new patented technology is to reduce the intensity of slushing in the initial pulping stage of recycled paper,” says Mr Owe Sänneskog of Läckeby Water. “By reducing the treatment, energy is saved as a result. The process is advantageous in that impurities are not broken up, which makes it easier to separate them from the main pulp stream later on in the process.”

A newly developed screen has been introduced into this new system. It is called the TurboScreen and it works in principal as a pulper and a screen. This project has shown that energy savings can be as much as 50% in the energy intensive part of the recycled fibre treatment. In Sweden, in the long term, this could mean an annual savings to the amount of 50 to 150 Gwt. The quality of the fibres, from the pulping aspect, has proved to be as good as or even higher with this new technology.

## Co-operation led to finance

This big opportunity to save energy has resulted in interest from the Swedish Energy Agency, one of the financiers of the project. In that, researchers compared the components of the new system on an industrial scale, i.e. the TurboScreen with conventional technology. These comparisons were extremely encouraging. Now, the Swedish Energy Agency is contributing to the construction of a new research unit, viz. the entire system on a pilot scale.

The development of this new system for slushing recycled paper is one example of the importance of creating good systems for technical development. STFI-Packforsk combines scientific expertise with industrial know-how and



PHOTO: NORSE SKOG


contacts from the industry. This makes the Company into a viable partner, when it comes to development platforms for new industrial technology. The intense involvement of the Swedish Energy Agency in this new recycled paper technology was facilitated by the fact that such a platform could be created. By this means, new technology is combined with a fundamental and broad knowledge about fibre properties, process technology and conditions in the industry. Karl-Johan Grundström from STFI-Packforsk has played a central role in the project, with his thorough knowledge of process technology in the treatment of fibres. In this project, STFI-Packforsk has worked jointly with Läckeby Water Group, Roland Selin, the technology developer at JLR, Technocart SA, the Smurfit Lagamill paper mill, the Örebro paper mill and Noss.

## Comparisons spotlighted great potential

Technocart, a Greek recycled paper based mill, has been using a TurboScreen for quite some years, as a part of its pulp treatment system. Comparisons were made in the project between that particular system and the corresponding stages at the participating Swedish mills. The fibre quality was just as good and, in certain cases, better. At the same time, energy savings were from 16% to 33%.

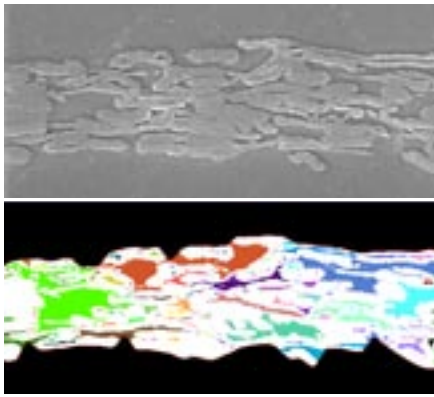
The whole pulp treatment systems were compared, including the refining and the dispersion. At the Greek mill, the dispersion system could be completely closed down, since the new screening system was so efficient. Taking into account the entire pulp treatment unit, the savings on energy were as much as fifty percent. ●

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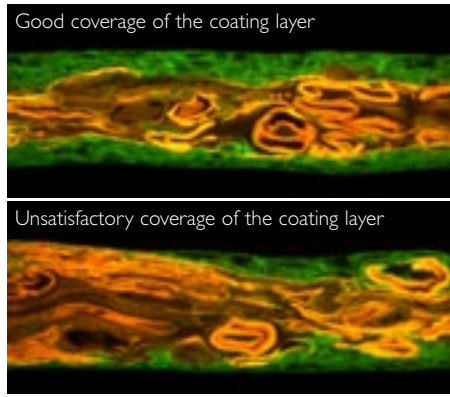
 **Det går att spara** stora mängder energi inom returpappershanteringen. En intressant teknik för effektivare uppslagning håller på att utvärderas och utvecklas i ett samarbete mellan bland annat Purac, teknikutvecklingsföretaget JLR Pulping och STFI-Packforsk. Projektet stöds av Statens energimyndighet, STEM.

Den nya, patenterade, tekniken går ut på att göra mindre del av uppslagningen av returpapperet i det inledande pulpersteget. Genom att minska bearbetningen där sparar man energi. Processen vinner också på att föroreningarna inte slås sönder, något som gör det enklare att sila bort dem senare i processen. Projektet har visat att energibesparingarna kan handla om så mycket som cirka 50% inom denna energi-krävande del av returfiberhanteringen.

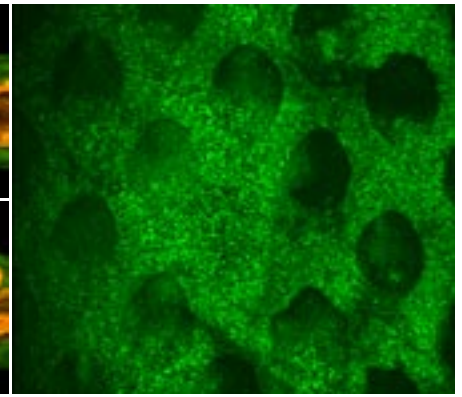
Utvecklingen av det nya systemet för uppslagning av returpapper är ett exempel på hur viktigt det är att skapa bra system för teknikutveckling.



With an electron microscope it is possible to find the pores and range them according to size.



Confocal microscope micrograph showing the coverage of coating layer on paper (left) and a sample with missing dots (right).



## To see is to know

There is some very sophisticated equipment housed inside the brick walls of 61 Queen Kristina's Street. One piece of equipment used for a large number of studies of various kinds is the microscope. The analysis of fibres and fines, measurements of the degree of fibrillation, recycled fibre studies and structural analysis are but some examples. Microscopy is consequently used in several of the research clusters.

"It's very rewarding to see what you're investigating and not only study figures. It assists in interpreting results," says Joanna Hornatowska.

A microscope is not merely a research instrument. It can also be of great help to the industry, when it comes to developing new products or solving problems. Along with the development of new paper properties, there is a need to know



At STFI-Packforsk, there is everything from a stereomicroscope to an atomic force microscope, which makes possible broader studies of the printing surfaces of paper as well as of the tiniest cellulose fibril.

how fillers work together with fibres and chemicals. By making a structural analysis of the paper, it is possible to see both the surface and the cross section and, in this way, obtain knowledge of the structure that has formed, whether it is bulky or compact, for example.

Cross-section analysis can be done on all kinds of paper, from the thinnest of soft crêpe paper to board, coated or uncoated. With cross-section analysis, it is possible to investigate how much an effect the press section or the calendering has on the structure of a paper by measuring the density and distribution of the particles in the z-direction, the pore sizes in the fibre network as well as the thickness and coverage of the coating on a paper. When it comes to board qualities, it is especially important to check density and bulk, where the aim is to obtain a bulky middle layer with dense structures in the outer layers.

For the structural analysis of cross-sections, STFI-Packforsk uses an Environmental Scanning Electron Microscope (ESEM) for this.

Joanna says, "ESEM is a very versatile instrument. It's unbelievably extensive in that it can be used for studying surfaces and cross-sections of many different kinds of materials. It can also do X-ray microanalysis to scrutinize the chemical composition of inorganic compounds in the substance being investigated. It is very useful in analysing spots and deposits in pulp and on paper".

For the study of paper surfaces and its surface porosity, a completely new measurement method has been developed at STFI-Packforsk. Another kind of microscope is used for this, viz. a confocal laser scanning microscope. This method is used to investigate problems that can arise with printing, i.e. missing dots. Another application is the study of the compressibility of paper, where different levels

of pressure are utilised that correspond to that in printing presses. This method provides 3-dimensional information as to how structure is changed during the printing.

With microscopic analyses, it is possible to discover irregularities in structures that are the cause of problems. When it comes to unfamiliar territory and substances, there is a very large store of amassed experience among the researchers at their disposal. Other forms of equipment are also available if necessary.

Joanna concludes, "The thing is to utilise the fact that we have advanced instruments as well as many researchers. In this way, we are always able to provide a customer with a suggested solution to a problem or give explanations as to what is causing a particular problem." ●

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### Mikroskopin används i flera av

STFI-Packforsks forskningskluster. Utrustningen, bestående av allt från stereomikroskop till atomkraftmikroskop, kan också vara till stor hjälp för industrin när det gäller att utveckla nya produkter eller att lösa problem. Genom att göra en strukturanalys av papperet kan man se både yta och tvärsnitt och på så sätt få kunskap om vilka strukturer som bildas, om de är bulkiga eller kompakta. Ett annat exempel är tvärsnittsanalyser. Med sådana kan man t ex undersöka hur pressning eller kalendrering påverkar papperets struktur genom att mäta täthet och fördelning av material i z-riktningen, porstorlekar i fibernätverken samt tjocklek och fördelning av bstrykningen i papperet.

– Det är mycket givande att se det man undersöker och inte bara studera siffror. Det hjälper till att tolka resultatet, säger Joanna Hornatowska, forskare vid STFI-Packforsk.





## New president in July

Professor Gunnar Svedberg, has been named the new President of STFI-Packforsk. He will take up this position on 1 July, 2006, when Professor

Thomas Johannesson is retiring, in accordance with his contract of employment.

Gunnar Svedberg is a professor of energy technology and is presently the Vice-Chancellor at Göteborg University. Prior to that, Professor Svedberg was the Vice-Chancellor at Mid Sweden University. He was in charge of this institute during the period it was developing into its present status of university. Gunnar Svedberg worked for a long time at the Royal Institute of Technology (KTH) Stockholm where he was Vice President.

Per Lindberg, Director and Chairperson of the Board at STFI-Packforsk, says, "Gunnar Svedberg has sterling management experience in intellectual assets companies and he is held highly esteemed and respected in research circles. He will be able to pursue the development of STFI-Packforsk becoming a leading international research company, to which Thomas Johannesson has laid the foundations."

What attracts me most is getting to work in the line of business that I got to know best during my years as a researcher. And, furthermore, to carry it out in a highly qualified and highly regarded research company that works in such close contact with its customers, says Gunnar Svedberg.

"Our greatest challenge is to be able to anticipate customers' needs within the short-term as well as the long-term." ●

### COMING EVENTS

#### MARCH

22–23 STFI-Packforsk Renseriikonferens, Borlänge  
[www.stfi-packforsk.se/renserikonferens](http://www.stfi-packforsk.se/renserikonferens)

#### MAY

9–10 Advanced Training:  
3-D structure of paper

31–1/5 5<sup>th</sup> Fundamental Mechanical Pulp Research Seminar, Trondheim

#### JUNE

7–9 6<sup>th</sup> Paper and Coating Chemistry Symposium  
[www.stfi-packforsk.se/pccs2006](http://www.stfi-packforsk.se/pccs2006)

#### AUGUST

28–1/9 5<sup>th</sup> Plant Biomechanics Conference  
[www.stfi-packforsk.se/biomechanics](http://www.stfi-packforsk.se/biomechanics)

For further information on coming events, see [www.stfi-packforsk.se](http://www.stfi-packforsk.se)



customer, who can be called a Lead Customer; then they would have the first buyer. It's not easy to sell on a large scale. That's why it's essential to find a very good first customer that will then lead on to the next one, what we call an Early Adopter, who would buy in larger volumes."

"We notice that bio fuels are becoming of much more interest. There are going to be explosive developments and it's imperative to ride that wave. Environmental consciousness is being transformed into "sustainable thinking", but it demands people with courage and a spirit of enterprise as well as leaders and ethical consignees/customers with a comprehensive view as a support."

Mikael Lindström is also aware that there is a need for big buyers to order large volumes if there is going to be a breakthrough for new materials from renewable raw materials such as bio fibre composites. This, moreover, requires excellent technical quality and competitive prices.

The local authority in Eskilstuna, Sweden, has displayed a lot of interest in matters of sustainability and Mikael is hoping that this municipality will act as a demonstration region for sustainability, when it comes to energy, transportation and materials.

Mikael adds, "My dream is that the aim of this County Council will be that, by 2010, 30% of all its purchased products will be made up of new materials from the forest." ●

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## "Insist on renewable"

This is what Mikael Lindström, who is responsible for research development in the New Fibres for New Materials Cluster and Kristina Wickholm, the Cluster Manager, want companies to do when they purchase their goods. But how does one manage to get such a divided group of companies and individuals that comprise the industry to make such demands?

Who is going to demand of the automobile industry that car seats be made of bio composites or of hospitals that their furniture and consumables should consist of renewable raw materials? Just two examples.

To get opinions as to how one should go from Technology Push to Market Pull and to how to sound out a potential mar-

ket, a number of large and small production companies, public sector organisations, tertiary institutes etc. were invited to attend a workshop in the middle of January.

There was a great deal of interest. The participants were committed and appreciated the assembled energy that the workshop afforded. A significant result, mentioned by many that attended, was the existence of a new network that gave rise to valuable contacts.

Bengt Järrehult, SCA, stated that there is certainly no shortage of creativity among the researchers.

"Limitations lie in an ability to commercialise their ideas. It would certainly profit them if they could start developing products together with a visionary

## Have you changed address?

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# B



# Chip leaching gives a more flexible kraft pulping process

Producers of kraft pulp would have a more flexible process if they invested in chip leaching technology. It is possible to control troublesome impurities, such as calcium and manganese, thus reducing the risk of deposits occurring. Mill effluents can be reduced to a far greater degree than before, providing advantages, such as reduced water consumption and fewer risks of bothersome emissions.

Guest contributor: Nils Lindstrand



Martina Håkansson, Södra Cell Mörrum and Lars Norberg, STFI-Packforsk.

The technology has now been tested at the Södra pulp mill in Mörrum. The trials proved that the technique works superbly. Chip leaching is an acidic process with a pH level of about 2.5, which could cause corrosion and a negative affect on the pulp quality. However, no such effects have been observed. During the trials, a tank was fitted with instruments so as to act as a buffer for the acidic leaching liquor. A tank lorry provided the tank with sulphuric acid and the leaching of chips was then carried out in one of the batch digesters.

### Expert partner

"Mörrum's been a skilled and engaged partner in these trials," says Fredrik Lundqvist, Project Manager. "We've had a lot of points of measurement, so that we could see exactly how the chip leaching worked with respect to the removal of metals and the effects on pulp quality, for example.

Chip leaching is a technique that was developed and tested in the KAM and FRAM Projects, involving a broad collaboration among various partners, with STFI-Packforsk as the project co-ordina-

tor. One example is Harald Brelid from Chalmers who is one of the inventors of this chip leaching technique.

### Profitable investment

Chip leaching is a technology that allows processes to have lower volumes of effluent than was previously possible before this technique was developed. This is due to the fact that it is possible to remove the bothersome elements in the wood that otherwise cause deposits and cause the mill to stop production for cleaning maintenance. For mills, where it is difficult or expensive to get hold of water, a saving of water can be a decisive factor in the technology being a profitable investment.

"Producers of pulp have received a new tool that they can utilise in a way that benefits them the most," continues Fredrik. "For pulp mills, where standing-offs, due to high content of metals in wood, present a big problem, it's profitable to rapidly reduce the number of production stops. For another mill, it may be more important to reduce the volume of effluent. The technology can be used for different purposes and we have now

shown that it works on a mill scale. The only thing now is for the pulp industry to display concrete interest in the technology, so that it might be developed into a commercially viable technology. The trials at Mörrum prove that there is such a potential. ●

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**Massatillverkare får** en mer flexibel process om de investerar i teknik för flislakning. Man kan styra innehållet av störande ämnen som kalcium och mangan, och därmed minska risken för beläggningar. Fabriken kan slutas mer än tidigare, vilket ger fördelar genom minskad vattenförbrukning och mindre risk för störande utsläpp.

Tekniken har nu provats vid Södras massafabrik i Mörrum. Flislakning är en sur process, vilket skulle kunna ge farhågor om korrosionsproblem och negativ inverkan på massakvaliteten, men några sådana effekter har inte noterats. Inte heller större flislakningen övriga processer.

Metoden har tagits fram och testats inom projekten KAM och FRAM.



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