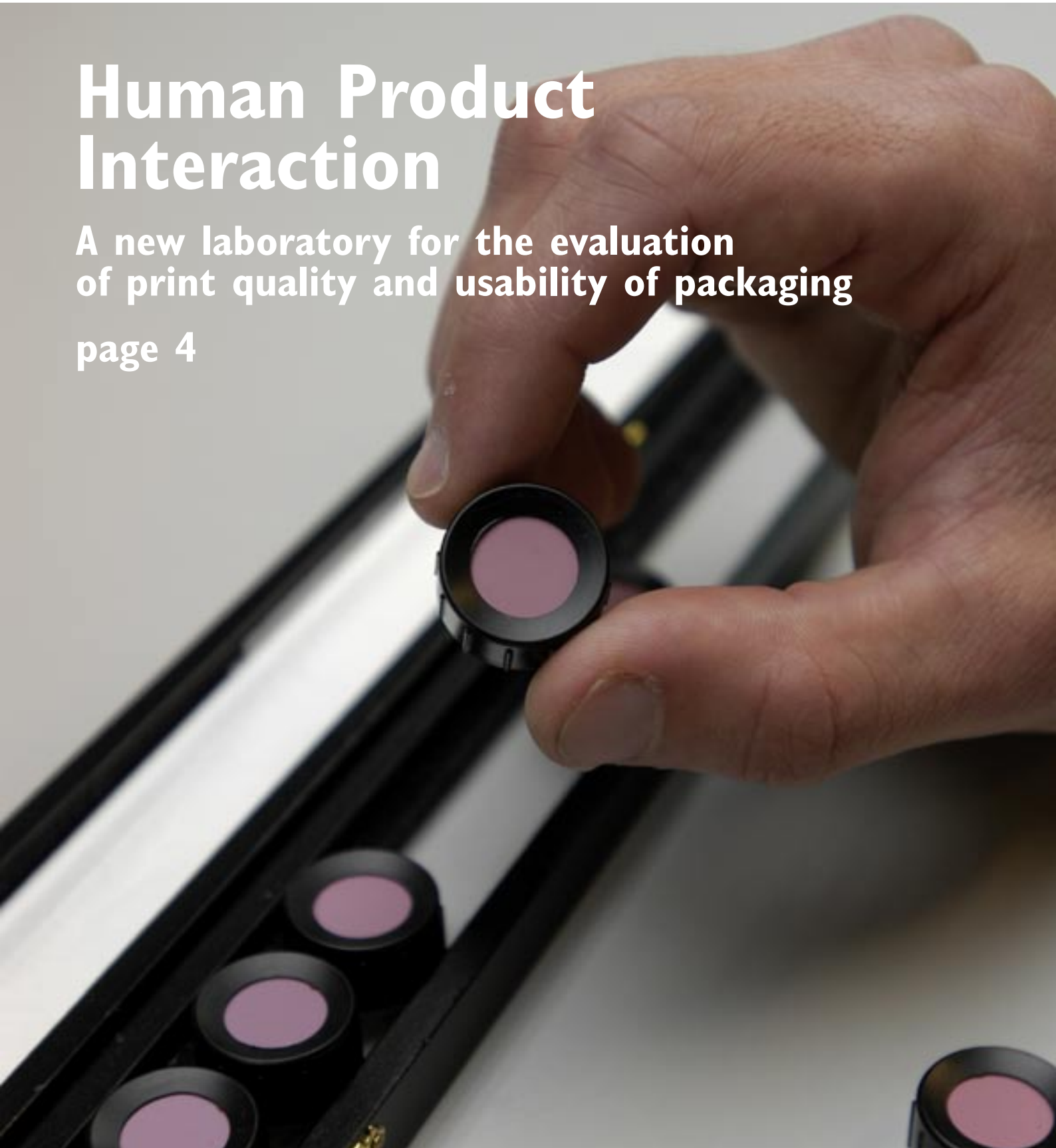


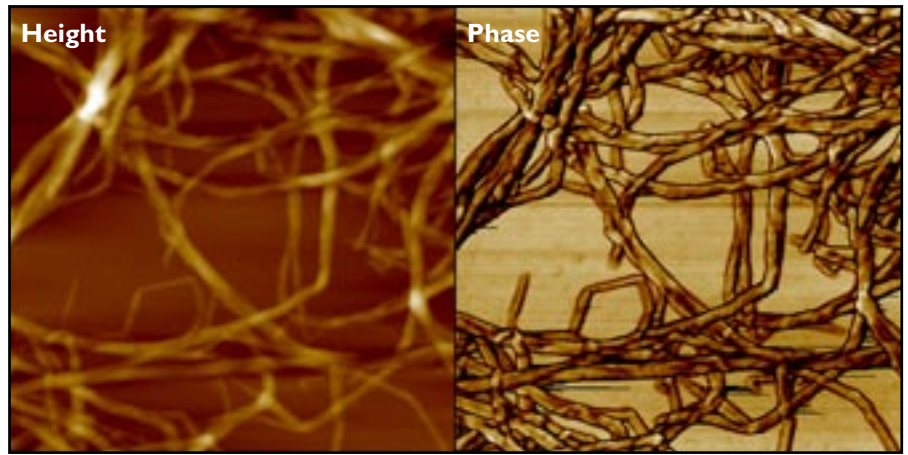
Human Product Interaction

A new laboratory for the evaluation of print quality and usability of packaging

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Strongest paper in the world



Atomic Force Microscopy of nano cellulose. Microfibril thickness c.c. 20 nm. (AFM picture: Janne Laine, HUT)

“We’re going to break the world record for strength,” states Professor Tom Lindström, employed at STFI-Packforsk but also having one foot in the door at the Royal Institute of Technology in Stockholm. He is talking about a strong paper that is one of the many goals of the research and development taking place with the assistance of nano technology.

To attain this strength, researchers are working with nano cellulose, amongst others. Tom Lindström describes the technology like this: “Nano implies that you work with tiny, tiny components, generally between 1 nm to 100 nm (1 nm = 10^{-9} m). A fibre consists of micro fibrils that resemble long threads. You loosen them, roll them out and then attach them on other normal fibres. By this means, you can provide the fibres with new properties; in this case, strength properties.”

STFI-Packforsk is the only company responsible for several breakthroughs in the area of nano cellulose.

“Should we succeed with these attempts, they will represent a concept-breaking technology,” continues Tom Lindström.

Nano composites is yet another area, among many, where intensive research is currently taking place. Plastic films,

common in the context of packaging, can give better gas and grease resistance when you mix montmorillonite clay in. This clay consists of thin flakes and if they are introduced in a certain manner, it is more difficult for gases and fat molecules to make their way through the film, in spite of the fact that the flakes of clay are still almost transparent.

“Our strength in all this is our know-how of processes,” adds Tom Lindström.

Nature as a prototype

Furthermore, there is a unique research programme in the topochemical modification and nano structuring of fibres.

“We are gathering inspiration from building blocks in nature,” says Tom Lindström, and he mentions the lotus flower as a good example.

“Its leaves possess an extraordinary water resistant surface which makes the flower self-cleansing, a reason why it is the symbol of Buddhism.”


Nano technology is certainly not a new thing. Back in the 1960s, Nobel laureate Richard Feynman saw the possibilities of the smallest building blocks in different materials.

With the help of nano technology, new instruments were developed in the 1980s

and there was a big breakthrough when Toyota came up with nano composites. These days, nano technology is a fashionable word that partly covers earlier research efforts but also embraces many new ones.

Nano technology is going to be very significant in the future for achieving improved materials, often with fewer resources. At STFI-Packforsk, there are a lot of different projects running that are financed from various sources. VINNOVA is supporting explorative research aimed at concepts for new materials. The EU grant that Sustainpack has received will lead to new applications in the areas of coating and new films, for example. STFI-Packforsk Cluster research, financed mainly by the Forest Industry is scientifically directed at new technologies that may become concept-breaking. ●

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 **Nanoteknik** kommer att ha stor betydelse i framtiden för att få bättre material, ofta med mindre resurser. På STFI-Packforsk bedrivs ett antal olika projekt på området, från grundläggande forskning med stöd från VINNOVA och EU till mer industrinära klusterforskning med vetenskaplig inriktning mot ny teknologi som kan bli paradigmbrytande.

– Med utveckling av nya material ska vi göra bättre papper och kartong, och vi ska göra det möjligt att få bättre barriär- och tryckbarhetsegenskaper, säger professor Tom Lindström.

För att få denna styrka arbetar forskarna bl a med nanocellulosa. STFI-Packforsk är det enda bolag med flera genombrott på detta område. Intensiv forskning pågår även på nanokompositier. Plastfilmer som är vanliga i förpackningssammanhang, kan ges bättre gas- och fettresistens genom att man blandar i montmorillonitler.

– Vår styrka här är processkunskanden, menar Tom Lindström.



“By developing new materials, we will come up with improved paper and board qualities. And we will make it possible to achieve better properties for barrier and printability”, says Tom Lindström.

ISA intends to export Swedish packaging expertise

ISA, the Invest in Sweden Agency, has initiated a project that, in its first phase, has been commissioned to make a survey of the state-of-the-art expertise that exists in the Swedish packaging industry.

The aim is to start an international marketing project in January 2006, by the latest, for attracting direct foreign investment in the Swedish packaging branch.

Ebba Lindegren, Project Manager, says, "We have identified four areas of strength, where state-of-the-art expertise exists in Swedish packaging-related research and industries. These areas are:

- *New materials:* Renewable materials, Composites and Barriers
- *Human Product Interaction:* Perception, Design, Usability and Print
- *Systems and Processes:* Safety/Traceability and Indicators, Packaging Logistics and Sustainability and
- *Energy and Recovery:* Materials Optimisation, Reuse & Recycling and Energy Recovery."



During the last few months Ebba Lindegren has interviewed close to a hundred people representing the packaging branch from both trade and industry and academic institutes.

The survey includes all of Sweden. The participating counties are Värmland, Skåne, Västernorrland, Jönköping, together with the regions of Göteborg and Stockholm.

"In this survey, it was important to obtain the participation of different parties representing the entire value chain, from the raw materials to the material producers, converters and recovery," continues Ebba Lindegren.

The next stage in the project is to attract partners, members of trade and

ISA, Invest in Sweden Agency,

initierar ett projekt, för att kartlägga den svenska förpackningsindustrins spetskompetenser. Målet är att starta ett internationellt marknadsföringsprojekt för att attrahera utländska direktinvesteringar inom förpackningsområdet till Sverige.

– Vi har identifierat fyra styrkeområden där Sveriges förpackningsrelaterade industri och forskning har spetskompetens, säger projektledaren Ebba Lindegren. Dessa områden är: *Nya material, Human Product Interaction, System och Processer* samt *Energi och Återvinning*.

Kartläggningen omfattar aktörer som representerar hela värdekedjan allt från råvara till materialtillverkare, konvertering och återvinning.

industry, academic institutes and the general public in order to internationally market the knowledge, expertise and know-how that exist in research and the packaging related industries in Sweden."

The project was instigated by the The Packaging Arena, a venture from Värmland that has the goal of developing a project for marketing, on an international level, Swedish packaging expertise. ●

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Reliability of measuring equipment

Does the newsprint web sit properly in the printing presses? Does the kitchen paper have the right absorbency? Does it have the correct tear index? The situation is not so good when the measuring equipment in the laboratory does not provide the correct results and there are direct consequences in the end product. By participating in comparative testing

circles, a company is able to compare its results with those of other companies and, at the same time, get a check on its own measuring equipment.

There are currently 29 companies participating in the STFI-Packforsk comparative testing circle for pulp testing. They are mainly research institutes and pulp and paper producers from Europe and South America. This enterprise has a lot of potential for expansion. According to Anette Lindé, Group Manager for Physical Testing at STFI-Packforsk, there is an ever increasing need for comparative pulp testing. This is even a requirement for any laboratory applying for certification and accreditation. According to the present ISO norms, it is necessary to be able to demonstrate reliability by participating in comparative testing circles.

Testing is carried out twice a year and includes chemically bleached soft and hardwood pulps. The pulps are sent either in a fully diluted suspension or as dried pulp sheets to be beaten. Member companies then have 3 to 4 weeks to do the tests and submit the results to STFI-Packforsk. Subsequently, the results are analysed and compiled in a report to be sent back to the participants.

Apart from the comparative testing of pulp, STFI-Packforsk offers testing circles for newsprint, magazine paper and tissue. The Company is also responsible for coordinating CEPI-CTS, the Comparative Testing Service of the Confederation of European Paper Industries. ●

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Margaretha Fryklund at the PFI mill. The STFI-Packforsk laboratories for the physical testing of pulp and paper have been accredited with the EN ISO 17025 Certificate.

Genom att delta i jämförande

provningssringar kan företag jämföra sina resultat med andras och samtidigt få kontroll på sin egen utrustning. För laboratorier som ska ansöka om certifiering och ackreditering är det också en nödvändighet. Enligt gällande ISO-normer måste man kunna bevisa sin pålitlighet genom att delta i jämförande provningssringar. STFI-Packforsk tillhandahåller provningssringar för massa, tidnings- och journalpapper och för tissue (mjukpapper). Företaget är också koordinator för CEPI-CTS, Comparative Testing Service of the Confederation of European Paper Industries. I den jämförande massaprovningsringar deltar idag 29 företag inom massa- och pappersindustrin från framför allt Europa och Sydamerika.



Subjective print evaluation. The HPI Laboratory utilises trained or non-trained test panels to appraise and evaluate print quality.



User tests. By means of a one-way mirror, researchers and clients are able to study how people in different test panels react, interact and handle a variety of products.

Human Product Interaction

A new laboratory for the evaluation of print quality and usability of packaging

The new STFI-Packforsk Human Product Interaction Laboratory (HPI) provides customers with added knowledge as to how their packages and printed materials are perceived by end users. Here the Company combines its own research with standard and well-tested methods for the evaluation of print quality and usability of packaging.

“This is an area that is becoming all the more important for “mature” industries reacting to the market,” says Siv Lindberg, a researcher in the Appearance and Imaging Group.

“The significance of placing the customer in the centre and to know in what way people will perceive a piece of printed matter or the use of a package is growing in importance.”

The HPI Laboratory is comprised of separate laboratories for perception and usability, as well as a fully-equipped control and observation room. Here you can get a complete grasp on how a package or printed matter will be experienced and interacted with by assessing how it will be perceived visually, experienced tactilely and, in the case of packages, how manageable they are.

“Experiencing quality is something both visual and tactile,” says Siv Lindberg.

“That’s what brings our two areas of work together.”

Birgitta Nilsson, a researcher at the Packaging and Logistics Division relates that they now have the opportunity of further developing package handleability as well as how we, as people, observe and perceive printed information on packages.

Several evaluation methods STFI-Packforsk employs established methods; however it has developed its own methods too.

One of the methods for assessing the manageability of a package involves the utilisation of test panels. Panel mem-



Eye-tracking camera. Researcher, Annika Lundström, adjusts the eye-tracking camera prior to a print quality evaluation.

bers judge how easily a package can be handled with respect to opening, emptying, re-closing and recovering it.

The assessment of print quality and mottling, for instance, is carried out using standardised test routines under standardised viewing conditions. Both trained and untrained test panel members are used for this.

“All the assessment methods emanate from research, standards, and reliable, well-tried test routines. The data may be both quantitative and qualitative,” says Sandra Pousette, another researcher at the Packaging and Logistics Division.

The HPI Laboratory has different rooms for observing how we use and handle packages. The facilities are also used for perception studies, where the visual experience of print quality is appraised mostly. Between the two rooms, behind one-way mirrors, is the technical and observation room with recording facilities. Researchers and clients from commissioning companies are able to observe the different tests without disrupting a session that is in progress.

“This gives us the practical chance of using each other’s methods in new contexts,” says Siv Lindberg.

“There’s yet another exciting aid that provides us with the possibility of understanding how people view print and packages. It’s our eye-tracking camera. It

registers how the eyes move while looking at a product.”

Client commissions

Apart from research work, the researchers work with commissions from industry.

“In most cases, customers want our assistance with complete studies; everything from formulating the questions at issue to preparing suitable studies and carrying them out,” says Siv Lindberg.

“Naturally, there are customers with their own particular areas of expertise that request help with certain aspects of their various studies.”

Siv mentions one advantage and that is the prospect at STFI-Packforsk of doing blind tests, as they are called, on print appraisal, since it is not necessary to know the kind of paper material used in the evaluation.

“This means that we are able to carry out neutral and objective assessments. A further advantage for our customers is that they can get a more detailed insight into how perceptual aspects and usability factors influence interaction with a product by being able to follow the tests from the observation room.” ●

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Tactile and visual interaction. The new Human Product Interaction Laboratory group: Birgitta Nilsson and Sandra Pousette, working with packaging usability, and Siv Lindberg and Annika Lundström, working with appraising visual print quality.

STFI-Packforsks nya laboratorium

för tryckutvärdering och användbarhet, Human Product Interaction Laboratory – HPI, ger kunderna ökad kunskap om hur deras förpackningar och trycksaker uppfattas av slutanvändarna. Här kombineras egen forskning med standarder och beprövade metoder inom tryckutvärdering och användbarhet.

– Detta är ett område som blir allt viktigare för ”mogna” industrier som agerar på marknaden, säger Siv Lindberg forskare på Perception och bildanalys. Betydelsen av att sätta kunden i fokus och veta vad och hur människan upplever en trycksak eller användandet av en förpackning ökar.

HPI är ett laboratorium för perception respektive användbarhet. Här kan man ta ett helhetsgrepp på upplevelsen av och interaktionen med en förpackning eller trycksak genom att utvärdera hur den uppfattas visuellt, hur den känns (taktilt) och, i fallet med förpackning, hur hanterbar den är.



Databases & 100 year old literature

Computers with search engines for literature, 600 journals, 13,000 volumes of technical literature and reading corners that take up 200 m² of space, plus two record archives can be found at the STFI-Packforsk Information Centre. In this thirst-for-knowledge goldmine, there are also conference compendia on CD-ROMs plus the research reports of the Company itself.

"We have a unique collection of literature and electronic information on pulp, paper and packaging, plus a great deal of other related information," says Camilla Burman who is responsible for the running of the unit.

Databases and technical literature about pulp and paper have received an additional contribution of sound informa-

tion on packaging through a merger with the extensive Packforsk library, together with integration of the Framkom library.

"For some of our journals, there are complete collections going back as far as a hundred years," comments Camilla.

"They may seem all too much passé, but they are still surprisingly in great demand. It was in the 1930s and 1940s that a lot of pioneering research occurred and this became the basis of today's developments. In the old literature, many references can be found to draw on for new treatises, theses and dissertations."

At the website, you can search for information, free of charge, or order reports, articles and borrow books. For searching in Paperbase, the international database that STFI-Packforsk has jointly built up with KCL, CTP and Pira, a subscription is required. If you are pressed for time or feel at a loss, the Information Centre staff can help you to search in some of the hundreds of databases that they have access to or even searching further on the Internet.

It is even possible for you to be continually updated in a certain subject by having a standing surveillance profile.

The Information Centre manages the information services or even the entire library of some other companies. Here, you order books for lending, copying and literature searches, which reduces a customer's need for resources and the otherwise necessary premises to house them.

"It all works quite smoothly with the Internet. Our own researchers most often

Email their requests. And there is no difference whether you are ordering from in-house or externally."


The latest commissioned work is for SP Träteck, a research institute.

"This is quite new and yet it works very well," says Göran Fahlén, Unit Manager in Stockholm.

"Naturally, one of our main strengths is that we both work in an area that's close at hand. The both of us have strong links to the Forest Industry." ●

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 **STFI-Packforsk** Information Centre har en unik samling av litteratur och elektronisk information om massa, papper och förpackningar och mycket annan närliggande information. På www.stfi-packforsk.se kan du söka information kostnadsfritt eller beställa rapporter, boklån och artiklar. För sökning i den internationella databasen Paperbase krävs abonnemang. Information Centre hjälper också till med sökningar i de hundratals databaserna eller vidare ut på Internet. Du kan också bli ständigt uppdaterad inom ett visst område genom att ha en stående bevakningsprofil. Information Centre sköter informationstjänster åt vissa andra företag, vilket minskar kundens behov av resurser och lokaler. För SP Träteck sköts hela biblioteket.

- En styrka är naturligtvis att vi arbetar inom närliggande områden, säger Göran Fahlén, platschef på SP Träteck i Stockholm.

Another big EU project successfully landed



PHOTO: M-REAL

Eforwood has been approved. Eforwood is the third application from the European forestry based sector to the EU Commission concerning an Integrated Project within the scope of the 6th Framework Programme for Research and Development. Contract negotiations have yet to be finalised. STFI-Packforsk is going to have a very involved and responsible role in the four year project, which is to be co-ordinated by Skogforsk.

In a world where a mere 5 % of EU applications are granted, it is a unique thing that three out of three applications have been awarded to Integrated Projects. Eforwood has been up against strong competition from other industries such as the agricultural and the fishing industries, both of which have sustainable growth as their aim.

“Never before has the European Forest Industry strived so ambitiously to gain a comprehensive picture of the forest industry itself,” says Lennart Eriksson at STFI-Packforsk. Lennart has been part of the Core Group that formulated the application.

“For the first time, forest owners along with the timber, pulp and paper industries in Europe will work jointly to produce methods that, on a scientific basis, give weight to the various social, financial and environmental aspects of sustainable growth.

STFI-Packforsk is directly involved in three of the six modules that Eforwood comprises. For M3, Forest to Industry, Sven-Olof Lundqvist is the contact person; for M4, Processing and Manufacturing, it is Peter Axegård; and for M5, Industry to Consumer Interactions, it is Carl Olsmats who is also Module Manager. The Company will be furthermore involved in M1, Sustainability Impact Assessment, through the participation of Maria Enroth.

Lennart Eriksson continues, “The scope we cover, from the tree in the forest all the way to the consumer, gives us uniqueness as a research organisation and this is one of the reasons for our extensive involvement in Eforwood.”

This project has enormous potential. By generating discussions across all

boundaries, a basis for intelligent measures will be built up. This project is going to influence how the EU Commission formulates its future policies and directives.

“Industry now has a real opportunity of becoming proactive.”

There are no good methods for controlling and evaluating sustainable growth. So far, only limited sections have been optimised, which has often caused setbacks in other areas. This project signifies an interesting platform where, with research as a basis, science and politics are tied in together.

“The most important thing is that the tools developed by Eforwood are going to be scientifically substantiated. It will be difficult and it will require humility,” says Lennart Eriksson.

It took several years of planning and developing the application for the project before Eforwood was finally granted. It is calculated that the extent of the project will reach € 19 million, of which slightly more than half will be paid for by the EU. The balance will have to be made up by participants in the project. In the case of STFI-Packforsk, the bulk of the co-financing will have to come from interested companies. ●

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Eforwood, den tredje ansökan

från Europas skogsbaserade sektor till EU-kommissionen om ett Integrated Project, har beviljats. Omfattningen beräknas till 19 miljoner euro. Kontraktsförhandlingar återstår. STFI-Packforsk kommer att ha tunga uppgifter i det fyraåriga projektet som koordineras av Skogforsk.

– För första gången kommer skogsägare och trä-, massa- och pappersindustrier i Europa att samarbeta för att skapa metoder som på vetenskaplig grund väger samman sociala, ekonomiska och miljömässiga aspekter för en hållbar utveckling.

Hittills har bara avgränsade delar optimerats, vilket ofta gett bakslag inom andra områden. Projektet innebär en intressant plattform där man med forskning som bas knyter samman vetenskap och politik.

COMING EVENTS

JUNE

- 14–16 SPCI 2005
- 14–16 2005 International Pulp Bleaching Conference

SEPTEMBER

- 20–21 Future Role of Print & Media
- 21–24 GRAFEX
- 28–29 Advanced Training: Stock preparation and fibre properties

OCTOBER

- 3–6 Packaging Diploma Course, session IV
- 4 Research seminar for partner customers
- 5 T2F mini-seminar on prepress
- 11–12 Advanced Training: Spots and deposits
- 18–19 Advanced Training: Paper surface properties
- 25–26 Advanced Training: Fibre development in mechanical pulping

NOVEMBER

- 9–10 The European Forest-based Sector Research Forum 2005: Innovative and Sustainable Use of Forest Resources
- 21–22 Packaging Diploma Course, session V
- 22 Meeting – Swedish Packaging Guild
- 22–23 Advanced Training: The potential of digital printing
- 29–30 Advanced Training: Fibres from forest to paper



Have a nice
summer!

Beyond will be back in September.
We wish all our readers a nice summer
and happy holidays!

Have you changed address?

Please let us know by sending an e-mail to info@stfi.se.



B



Turning science into reality

Meet STFI-Packforsk at Stand 18:18 in Hall A and learn more from our 10 minute seminars. Each day, every hour on the hour from 10 to 3 pm. The topics will be the following:



Tuesday, 14 June

10.00	A novel process for efficient removal of lignin from kraft black liquor	Per Tomani
11.00	Linting in offset printing	Miroslav Hoc
12.00	EuroFEX – always turning science into reality	Anna Wiberg/Anders Mähler
13.00	Material assessment in accordance with EU Packaging directive	Ann Lorentzon
14.00	Black liquor gasification – new energy and pulping strategies allowed	Niklas Berglin
15.00	Mill trial experiences of chip leaching prior to kraft cooking	Fredrik Lundqvist

Wednesday, 15 June

10.00	The Human Product Interaction Laboratory – what we can do for you	Sandra Pousette
11.00	From micro cosmos to web break – small creatures that cause big problems	Anne Stockenberg/Ewa Lie
12.00	Measurements and simulations for better use of fibres	Sven-Olof Lundqvist
13.00	The Engineered Sheet Structure – stratified forming	Daniel Söderberg
14.00	Measurement of the distribution chain – benefits for the pulp and paper industry	Thomas Trost
15.00	EuroFEX – always turning science into reality	Anna Wiberg/Anders Mähler

Thursday, 16 June

10.00	EuroFEX – always turning science into reality	Anna Wiberg/Anders Mähler
11.00	The Engineered Sheet Structure – stratified forming	Daniel Söderberg
12.00	Measurements and simulations for better use of fibres	Sven-Olof Lundqvist
13.00	A new method for measuring printing press runnability	Mattias Drotz
14.00	Chemical analysis – from science to application	Elisabeth Sjöholm
15.00	Foresight – be prepared for the future	Åsa Abel

Make our stand the place to meet. We have plenty of room for you to book a meeting with one or more of our STFI-Packforsk colleagues.

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