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application
CURRENT AWARENESS FROM STFI-PACKFORSK | #5/2006

Research networking with technical institutes

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PHOTO: JOHAN OSSON

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The inter-laboratory comparisons conducted by Marianne Björklund Jansson and her colleagues at the Chemical Analysis laboratory contribute to increased quality of the participating laboratories.

Comparisons make for improved laboratories

Vital and, in many cases, expensive decisions are made, based on results from chemical analyses. By participating in inter-laboratory comparisons, the reliability of analyses can be raised.

STFI-Packforsk conducts such comparisons for a range of tests carried out in the pulp and paper industry.

"This kind of work contributes to the quality of laboratories being maintained and increased," comments Marianne Björklund Jansson. "Chemical analyses have a number of possible sources of error. They may concern unsuitable routines, something wrong with the pretreatment of the samples or with the instruments used for analysing. Thanks to inter-laboratory comparisons, measures can be taken swiftly before the incorrect analyses affect products or emissions."

Currently, 40 to 50 laboratories utilise the STFI-Packforsk inter-laboratory comparison services.

They all receive an inquiry

A round of tests commences with a sample being handed in by a mill that has a suitable process for supplying samples for these tests. The samples are of various types, e.g. chemical pulp, white liquor, waste water, paperboard etc. STFI-Packforsk tests all the samples to establish whether the parameters that are to be analysed can actually be measured on the sample itself.

Samples in suitable amounts are sent to the laboratories that have shown interest in participating in the comparisons. The test results are then returned for statistical processing.

"Each participating laboratory gets to know what the merit of its own results is. As to the rest, the reports are written so that all participants remain anonymous," continues Marianne. "The staffs of mill labs are also able to see where they stand in relation to other laboratories, but they don't know which labs lag behind in the other measurement values."

Laboratories from all over the world participate

There are often demands on accredited laboratories to participate in different inter-laboratory comparisons. Currently, STFI-Packforsk is accredited for analysing waste water and product safety of materials intended for contact with foodstuffs. Among others, these are the areas for which inter-laboratory comparisons are being organized. For the typical kinds of analyses, such as kappa number or viscosity, 30 laboratories presently take part, most of them in Sweden.

The fees for participating laboratories are calculated according to how many parameters in the inter-laboratory comparison that they take part in. However, there is a ceiling fee that is very advantageous for those laboratories that handle many kinds of analyses.

"Inter-laboratory comparisons are of enormous benefit for participating companies and, furthermore, the information gets better, the more labs that take part," says Marianne. "New as of next year, we are going to send out inquiries about several analyses for product safety, for example the bleeding of optical whitener and formaldehyde in water extracts from paper."

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Viktiga och i många fall dyrbara beslut tas med kemiska analysresultat som grund. Genom att delta i provningsjämförelser, kan man öka tillförlitligheten på sina analyser. STFI-Packforsk leder sådana jämförelser för en rad tester som utförs inom massa- och pappersindustrin.

Enligt Marianne Björklund Jansson har kemiska analyser många tänkbara felkällor, som t ex olämpliga rutiner, fel på de mått som används eller fel på analysinstrumenten. Tack vare provningsjämförelser kan åtgärder sättas in snabbt, innan de felaktiga analyserna påverkar produkter eller utsläpp. På så sätt bidrar verksamheten till att kvaliteten vid laboratorierna kan bibehållas eller höjas.

I dag använder mellan 40 och 50 laboratorier STFI-Packforsks tjänster inom provningsjämförelse.

A robust organization with the customer in focus

In February 2004, when STFI-Packforsk became a majority owner of PFI AS, a Norwegian research institute, Swedish and Norwegian expertise in pulp and paper technical research came together under the one roof. Two years later, a further step in consolidating this knowledge is being taken. In the fields of Mechanical Pulp, Fibre Science and Chemical Analysis, expertise groups have been formed within the Company Group.

"With combined company groups, we are able to make the work more effective and efficient and thus attain a more distinct customer responsibility," says Dr. Peter Axegård, Manager of Fibre, Pulp & Energy, the division in which the expertise groups operate. "When it comes to the customers, it is easier for them to communicate with us when clearer areas of responsibility have been created," he adds.

Geographically, there have been no moves and many on-going projects have not been significantly affected except in "Mechanical Pulping", a research cluster where a joint programme has been set up. However, this collective expertise can be a good ground for new possibilities, when it comes to assignment work and during the forthcoming period of contract. Nevertheless, a number of changes have already taken place in the current Mechanical Pulping Research Cluster.

"PFI has enriched us with several top researchers who are a stimulus to our work, yet there are more advantages. Since we now have access to more public financiers, we have increased opportunities for seeking support for our research projects," Peter Axegård points out.

Still it is not only in the field of research that co-ordination has taken place. Elisabeth Sjöholm is responsible for analytical work at both STFI-Packforsk and PFI. In her opinion, a co-ordination phase is still going on, when it is necessary to make an inventory of the know-how, ways of working and equipment in order to create a more robust group that is able to meet customer demands and enquiries.

"By channelling the work, we can more easily discover particular needs and thus develop our operations," concludes Elisabeth Sjöholm.

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När STFI-Packforsk i februari 2004 blev majoritetsägare till PFI AS samlades Sveriges och Norges expertis inom massa- och pappersteknisk forskning under samma hatt. Ännu ett steg i utvecklingen har nu tagits i och med att koncerngemensamma kompetensgrupper bildats inom områdena Mekanisk massa, Fibervetenskap och Kemisk analys.

Enligt divisionschef Peter Axegård skapar koncerngrupperna tydligare ansvarsområden som kan effektivisera arbetet och göra det lättare för kunderna att kommunicera med företaget. Han framhåller också PFIs många spetsforskare som stimulerar arbetet samt att det nu blir tillgång till fler offentliga finansiärer som kan stödja forskningsprojekten.

The Chemical analysis expertise group gathered at PFI in Trondheim in Norway. The meeting was one step in the phase of making an inventory of the know-how, ways of working and equipment.

Profile

Peter Axegård

The Division Manager of Fibre, Pulp and Energy, Peter Axgård, talks enthusiastically about his former managers and role-models as his gurus. The irony is that he, himself, has perhaps become a guru in pulp research. Quite recently, he was engaged as an expert in a direct sent open hearing in Montevideo in connection with the public concern that has arisen over the plans for a new pulp mill in Uruguay.

Peter has worked at STFI-Packforsk for many years but, since 1974, he has fitted in a couple of outings to take on other challenges. After taking a doctor's degree and being a group manager for a couple of years, he was enticed to KemaNord in 1982 to build up a qualified knowledge base on the advantages of chlorine dioxide over chlorine gas, from scratch. This knowledge became invaluable when the dioxin bomb exploded in 1985.

After rescuing chlorine dioxide and establishing it as the most important bleaching chemical, Peter returned to STFI-Packforsk as head of the Pulp Department at the time. New challenges awaited him there, such as identifying what the big issues would be in the future. Out of this was born the Ecocyclic Pulp Mill Programme (KAM). The results of this not only made Peter contented as the programme manager but they made MISTRA and the industry that had financed the work pleased too. KAM led on to the FRAM Programme, which led on to LignoBoost, an innovation for lignin removal from black liquor. The many years of working in collaboration with Hans Theliander from Chalmers and Per Tomani became the basis for the successful development of a this new process of enormous commercial interest.

Peter's gifts with pulp production are renowned internationally. Not so well known are his talents for fixing things and pottering about the house and in the garden. Rumour has it that he is also an expert at the trampoline.

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Converting of new knowledge

The significance of R&D investments in innovations and economic growth is the topic of discussions in many countries. Both the scope and the concentration of the investments vary enormously. In Sweden, a great deal of R&D work is carried out in a number of major companies, where, to a large degree, it is a question of applied development work. The major part of public funding for research and development traditionally goes to universities and technical institutes. As a result of this, the Swedish institute sector is proportionately small, among other things.

Ten years ago, demands were placed on Swedish universities to work together with the surrounding society and provide information about what they are doing. It is not likely that the country's economic growth has been appreciably affected by this. With their close links to trade and industry, industrial research institutes have considerably greater chances of succeeding with the converting of research results to those that create growth. However it is required of those from the public sector to be prepared to invest substantially more than today in skills development at institutes and to make it possible for them to take greater risks in future projects.

A main task for universities and institutes is to develop new know-how and openly disseminate this to the world around. Research institutes ought to concentrate on utilising know-how for applications in trade and industry. This demands both very good knowledge about research and research results and the capacity to apply the results for creating value for customers in trade and industry and in society.

Close contacts and co-operation among universities and institutes are of fundamental importance for research institutes. Personal contacts between researchers in eminent institute environments and personnel from institutes constitute the most outstanding and effective ways to facilitate the converting of new know-how into industrial applications.

It is gratifying to be able to state that STFI-Packforsk has close contacts with a number of universities and technical institutes whose research environments are qualified and creative. We continue to develop these on national and international levels for the benefit of our customers.

Research networking with technical institutes

PHOTO: KTH

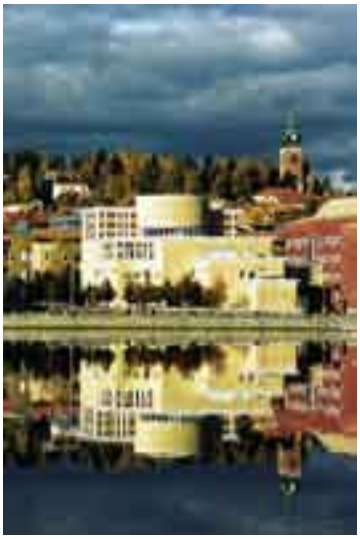

PHOTO: HÅKAN NORDSTRÖM

PHOTO: JAN-OLOF YXELL

One element of the STFI-Packforsk motto, "Turning science into reality", implies scanning the scientific world with our customers' problems and issues in mind. This searching is seldom a one-sided seeking for information. To a great deal, it occurs as a discussion with other researchers and organizations, with the aim of expanding research in fields significant to the interested parties of the Company.

As an example, it may be that there is a fundamental lack of knowledge in a certain important area. The task then is to work towards a commencement of research in that area at a university. An early step might be to find financing for a doctoral candidate, contact a suitable institute, find an examiner and, in many cases, act as a supervisor or tutor. However, the very first step is more often to sow a seed by starting a specific degree work. If this should take on, this seed could then be expanded into a completely new field of research with many people involved. One instance of this is the work with material models for paper, which is currently being pursued in co-operation with The Royal Institute of Technology Stockholm (KTH) and The Faculty of Engineering (LTH) at Lund University.

In another example, it could be that the basic knowledge has been in existence

Ongoing co-operations with KTH

Fibre and Polymer Technology: Professors Göran Gellerstedt and Lars Wågberg

Biofibre Materials Centre: Professor Tom Lindström

Fluid Mechanics: Professor Henrik Alfredsson

Solid Mechanics: Professor Sören Östlund

Media Technology and Graphic Arts: Professor Nils Enlund

Environmental Strategies Research: Associated Professor Göran Finnveden

Biotechnology: Professor Tuula Teeri

The Royal Institute of Technology (KTH), STFI-Packforsk and the Umeå Plant Science Centre (UPSC) at the Swedish University of Agricultural Sciences (SLU) have jointly started the new Centre of Excellence. The Centre for Biomimetic Fiber Engineering, Biomine, is working with the development of new innovative biomaterials that will combine high performance with environmental compatibility. "Wood is a fantastic material," pointed out Prof. Tuula Teeri, the Centre Director, at the inauguration on 24 August.

for a long time but traditionally it has been directed at wholly different fields with other issues to solve. Then it is up to STFI-Packforsk, with its wide-ranging expertise and experts in many different disciplines, to be able to see the possibility of applying the existing know-how to new areas.

To facilitate any exchange of information, it is necessary to find ambassadors for the customers' lines of business at universities and technical institutes. STFI-Packforsk is able to do this with the varied and vast networks it has. Its customers' questions at issue are put on the agenda of university researchers. This was so for the case, described on page 6, in fluid dynamics and the award winning idea of stratified forming in one head box.

Due to the physical presence of STFI-Packforsk on the campus of KTH, there is an excellent basis for networking with researchers in various scientific fields. It is the same with our subsidiary in Norway, PFI, and The Norwegian University of Science and Technology in Trondheim. Traditionally, STFI-Packforsk has naturally had a very keen collaboration with Fibre and Polymer Technology when it comes to pulp and paper production technology. In recent years, however, purposeful networking has increased interfaces and created strong ties with the science of the strength of materials, fluid mechanics, together with media technology and the graphic arts.

STFI-Packforsk enjoys established interchanges with other big Swedish universities, especially those in the line of technology. To give examples of these close contacts and on-going work, there is Chalmers (energy technology and bio-refining), Karlstad University (packaging as a service), the Mid Sweden University (printing techniques and quality), The Faculty of Engineering at Lund University (material models for paper) and Stockholm University (behavioural science). As a matter of course, STFI-Packforsk research operations also include contemporary global surveillance and spontaneous contacts are established with universities whose work lies at the research front. ●

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Material models for paper

STFI-Packforsk and Professor Christer Fellers saw, through the contacts with Tetra Pak among others, a need for being able to describe paper with the help of adequate material models. There was and still is a discrepancy between paper properties, measured using conventional measurement methods, and how the paper and board actually behave under the physical stresses they experience during converting stages, to give an example.

1991: Johan Tryding at Tetra Pak contacts STFI-Packforsk and Christer Fellers, as a central party in the field, with a request for material models of paperboard. But no such models exist at the time. Tetra Pak initiate a Master's thesis.

1993: Contact is made with Abaqus, a firm producing software for finite element modelling, Abaqus suggests contact with MIT in Massachusetts, USA, which is working with anisotropic material modelling. Discussions start up with Professors Mary Boyce and David Parks on the need for material models for paper and board.

1994: A pre-study starts as a cooperation between Tetra Pak, STFI-Packforsk and Abaqus.

1995: Professors Christer Fellers and Peter Gudmundsson, from the Solid Mechanics Department, the Royal Institute of Technology Stockholm (KTH), hold discussions on models for the non-homogeneous material of paper. In 1996, this results in a lectureship at KTH for Dr Sören Östlund who works part-time at STFI-Packforsk.

1996: A joint project begins among MIT, KTH and STFI-Packforsk, with Tetra Pak, Korsnäs Frövi (former AssiDomän Cartonboard) and Stora Enso as participants and financiers. PhD students at MIT and KTH. Development of models and experimental methods go hand in hand.

2003: Developments are taken further as part of a STFI-Packforsk Research Programme.

2006: This sees the start-up of the Liquid Board Cluster, a refined project focusing on material models. Several of the world's producers of liquid board participate.

Nära kontakter och samverkan med universitet och högskolor är av fundamental betydelse för forskningsinstituten. Personkontakter mellan forskare inom framstående högskolemiljöer och institutens personal är det i särklass effektivaste sättet att möjliggöra omsättning av ny kunskap till industriella tillämpningar.

Genom sina många och stora nätverk kan STFI-Packforsk se till att kundernas frågeställningar förs upp på agendan för forskarna på universiteten. Det kan till exempel visa sig att fundamental kunskap saknas inom något behovsområde. Uppgiften blir då att verka för en uppstart av forskning inom området vid något universitet. I ett annat fall kan den grundläggande kunskapen ha funnits länge men traditionellt riktat sig till helt andra branscher med andra frågeställningar att lösa. För STFI-Packforsk gäller det att se möjligheterna att applicera det befintliga kunnandet på nya områden.

Centre for advanced paper production and innovation

Collaboration and networking are two useful concepts when describing the path of a process or product from concept to innovation. It requires a person who can study a problem objectively and someone who can test the idea and find applications for it. With these, there is a basis for innovation.

The EuroFEX pilot paper machine at STFI-Packforsk

In the field of paper technology, there exists a solid and productive co-operation between STFI-Packforsk and The Royal Institute of Technology Stockholm (KTH). With only a few minutes walking distance between them, researchers, research students and project managers have access to all kinds of state of the art measuring equipment, laboratories and pilot plants. Altogether, these form a high technology centre for process developments in what is called "The Royal Cluster". However, beeing strong in designing the process technology of the future demands on-going further developments and upgrading. This is the reason why plans are on the way for a more formalised central structure, viz. CAPPI or The Centre for Advanced Paper Production and Innovation, where there has been a search for external funding in order to make it financially possible to invest in the necessary new equipment.

Anders Petterson, the Director of the Papermaking Division at STFI-Packforsk and, moreover, responsible for the Cluster Research Programme, explained the significance of the new Centre.

"Today, there is lot of concern about pursuing production efficiency, increasing the speeds of paper machines and producing more from fewer raw materials and with lower energy consumption. Furthermore, there is an interest in maintaining and strengthening competitiveness against other materials used."

Supplementary resources lead to new methods

The aim of CAPPI is to offer collective expertise from intra-scientific research to final applications for the paper industry. A great deal of Swedish basic research in the field of fluid mechanics of papermaking is done at The Fluid Physics Laboratory at KTH Mechanics. The research is based on experiments, theoretical studies and modelling. However, intra-scientific research must find applications to be tested. Such resources exist at STFI-Packforsk, which apart from industry focused research projects also houses EuroFEX, an exceptional pilot plant.

CAPPI research is mainly concerned with fluid mechanics. With better knowledge about how fibres behave in liquids and the forces that influence them, it will be possible to improve control over the papermaking processes and to develop completely new process solutions. With new techniques, the need for water, energy and raw materials will be reduced, while, at the same time, production will increase and new qualities will be developed, contributing to a boost in competitiveness.

"A spectacular example of this is the development of a new patented and award winning method for producing multi-layered papers," concludes Anders Pettersson.

The story of this innovation is described below. ●

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A new technique for stratified forming in one head box is built on an idea that solves the problems resulting from turbulence mixing the layers, and gives a high degree of sheet cleanness.

1995: The FaxénLaboratoriet (Centre for Fluid Mechanics in the Process Industry) at the Royal Institute of Technology Stockholm, commences as one of the VINNOVA* Centres of Excellence. The forest industry is involved and provides finance. Daniel Söderberg at STFI-Packforsk begins his PhD thesis on paper formation at the FaxénLaboratoriet.

2000: The idea is born when Daniel notices how similar problems are solved by fluid mechanics in aviation engineering, among others. The following year a patent is applied for and eventually granted.

2003: A larger scale project begins and continues today. Its aim is partly to develop the technique and partly to assess the potential for product development and improvement, together with financial viability. Individual pulp and paper companies invest in the project, along with Swedish and European public agencies. Collaboration with the fluid dynamics department at the Royal Institute of Technology Stockholm and Henrik Alfredsson continues.

2004: STFI-Packforsk is awarded the ATIP golden trophy for the best innovation in the field of paper technology. The technology is further developed in the EU-project ECOTARGET, to create a technology platform that can be the basis for industrial applications within a few years.

* Swedish Governmental Agency for Innovation Systems

Med tillgång till olika typer av avancerad mätutrustning, laboratorier och pilotanläggningar bildar STFI-Packforsk och KTH tillsammans ett högteknologiskt centrum för processutveckling. Nu planeras för en ny centrumbildning kallad "CAPPI" (the Centre for Advanced Paper Prodution and Innovation) med syftet att erbjuda en samlad kompetens från inomvetenskaplig forskning till färdiga applikationer för pappersindustrin.

En stor del av svensk basforskning inom området flödesmekanik görs vid KTH Mekanik. Forskningen baseras såväl på experiment som teoretiska studier och modellering. Den inomvetenskapliga forskningen kan sedan testas och utvecklas vidare på vägen mot tillämpning genom STFI-Packforsks industrinära forskningsprojekt och pilotanläggningen EuroFEX.

International cross-disciplinary conference

At the end of August and beginning of September, the 5th Plant Biomechanics Conference took place in Stockholm. The conference was a joint effort between STFI-Packforsk and the Wood Ultrastructure Research Centre (WURC), a centre of excellence at the Swedish University of Agricultural Sciences (SLU) in Uppsala.

The cross-disciplinary nature of the conference was evident in the presentations that ranged from the molecular structure in cell walls to how trees survive strong winds and hurricanes.

"The point of being cross-disciplinary is to be able to take know-how and knowledge from one field in order to apply it in a completely different one," says Lennart Salmén, who was in charge of the conference. "For instance, you can utilise research on the properties of other plants to obtain the same good properties in our wood fibres or to understand what the causes of negative properties are in our fibres." One example of advanced progress is how researchers have started to use cyclotron (a particle accelerator) in studies of the local properties of fibres.

"There are a lot of plants that have specialised functions, which could assist us in solving our commonplace problems," he explained. "Researchers are now trying to imitate how plants heal up when they are damaged, in order to construct composite material with the same healing function. This may be something for future packaging materials," he concluded.

The week long conference at the Royal Institute of Technology Stockholm attracted slightly more than a hundred participants, many of them from as far away as New Zealand, Japan, Mexico, USA, Israel and Iran. The programme also included this year's international WURC Seminar, where the latest research on the ultra structure of wood fibres was presented. STFI-Packforsk works closely with the WURC in its work with creating an understanding of how fibre cells are built up and the significance they have for various properties. The conference demonstrated that our research work is first-rate on international standards.

Lennart summed up the conference with the words, successful and appreciated. It showed that a great deal of progress has been made in recent years. ●

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A report from the conference is now available. For information and purchasing, contact lennart.salmen@stfi.se

The participants of the 5th Plants Biomechanics Conference gathered at the KTH Campus.

COMING EVENTS

NOVEMBER

13–15	Packaging Diploma Course, II
22	Advanced Training: NPE – Non-process elements in kraft pulp mills

DECEMBER

4	Second SUSTAINPACK Conference, Barcelona, Spain

JANUARY

16	Course: Packaging and the environment
22–24	Packaging Diploma Course, III

For further information on coming events, see www.stfi-packforsk.se

Successful workshop on biofuels at PFI

Attentive audience during the Biofuels workshop at PFI

Almost 80 participants attended the "Biofuels: Norwegian possibilities and challenges" workshop, which took place at the Paper and Fibre Research Institute (PFI) on 30–31 August. The workshop represented the first step in a process which will lead to a "roadmap" on biofuel production by the end of the year.

The first day of the workshop was used for discussions on the possibilities inherent in establishing a well coordinated, joint Norwegian biofuel initiative. The second day took place at the Statoil R&D center at Rotvoll, where presentations on current R&D projects related to biofuels were given.

The Workshop demanded a clear target from the governmental side for the use of biofuels in Norway, as well as the establishment of necessary framework conditions from the national authorities. A clearly expressed political will has to be followed by long-term framework conditions, which will contribute to predictability for the many participants in this field. ●

MORE INFO: www.pfi.no

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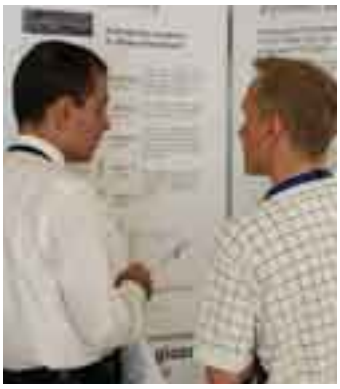

Conference rooms, the cafeteria and corridors witnessed discussions among the close on 80 participants. The international character of the seminar was evident with representatives from the UK, Austria, Brazil, Norway and Finland.

Highlight of the year

When STFI-Packforsk held its annual seminar for its Partner Customers, it was quite evident that there is huge interest in innovative research. There was standing room only in the STFI-Packforsk Auditorium when the new President, Gunnar Svedberg, warmly welcomed everyone. The majority of the participants had already got to know each other during the inaugural dinner held the previous evening. The expectation now was for a day of information, crammed with new technical discoveries and reporting from the Cluster Research Programmes.

The seminar was launched by Bengt Wiberg from Södra Cell International. He talked about the challenges faced mainly by the Nordic pulp industry, about a future where the greatest demand for paper will come from Asia. Bengt described a project where Södra, working jointly with STFI-Packforsk, examined the potential of making paper from pulp consisting of Scandinavian softwood pulp and non-wood pulps such as those from bamboo and straw.

SilviPak, the new packaging from Rottneros, was presented in the last number of Beyond. The seminar provided the opportunity of hearing Lars Blecko, the CEO of Rottneros, describing the 5 year project lying behind the innovation. Together with STFI-Packforsk, a wholly new packaging was developed, where production of the tray and lamination are done in the one and same process

During the remainder of the day, there were parallel activities and participants could, when the opportunity arose, alternate among the 4 sessions, viz. Fibre, Pulp & Energy, Papermaking, Surface, Print & Media and Packaging, Logistics & Sustainability."

Füsun Biber, a development engineer at Korsnäs, "Apart from the fact that it's so good to be given an update, it's also valuable to see the possibilities and opportunities you offer and to receive ideas as to how we can work together and which projects we could take part in."

Ingrid Bressler, Communications Officer at Södra, "By our taking part in this, it's being able to display to our customers that there is a great deal of know-how in our Company."

Per Sellerholm, Recovery Area Team Manager at AGA, "This seminar is a wonderful meeting place for providing new ideas. To get a briefing on the many different components complements those that one is familiar with. Like pieces in a jigsaw puzzle."

STFI-PACKFORSK

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