

Strategic funding paves the way for innovative ideas



PHOTO: FOTOGRAF JOHAN OLSSON

Being worthy of a name



Gunnar Svedberg
President

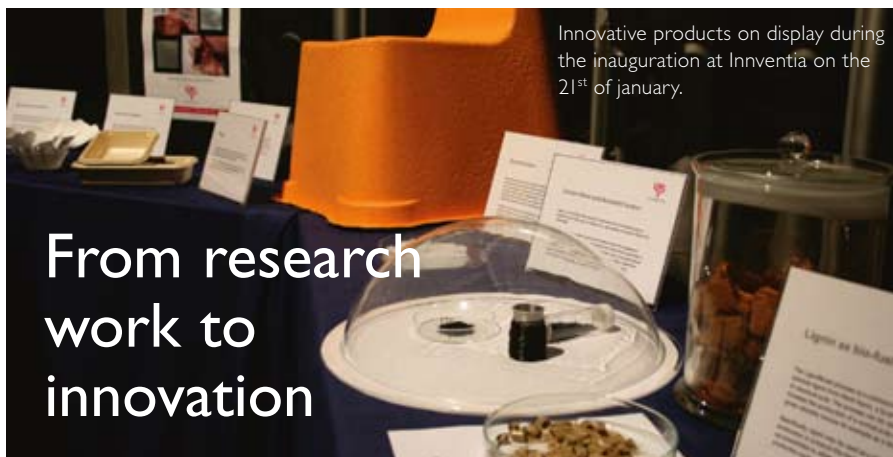
Our Company changed its name to Innventia in 2009. There were many good reasons for this. We wanted to draw attention to the fact that our operations today are different from the previous ones. From being a number of more or less state research institutes at one time, we are now a world leading company, when it comes to the refining of sustainable raw materials. We are continuing with research work and we are also working all the more with broadening our own and our customers' R&D results into innovations that will create value.

The State is a part-owner of Innventia. With its strategic funding for skills development, called SK Funding, it puts demands on Innventia to ensure that it will generate growth and renewal in trade and industry. It also requires us to collaborate closely with universities and institutes of technology. For us, this is naturally an obvious way to work. We would not have any customers from

trade and industry if we could not be of use to them. Additionally, we could not maintain the level of know-how and knowledge we have without close collaboration with seats of learning. The SK Funding means that we can develop our own research expertise and skills in carefully selected fields. In this way, we will become more attractive as a collaborative partner, as well as for the academic world.

Furthermore, the SK Funding makes it possible for us not only to work with what our customers are asking of us today, but also to be steps ahead in knowledge and know-how, which, in the long term, will enable us to create new business possibilities for trade and industry. To live up to the name of Innventia, we have to keep on being a first rate partner in innovation for our customers. ●

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From research work to innovation

How should Innventia work so that its operations will lead to new commercial processes and products? What are the best ways for us to operate as an innovation partner?

"Our vision states that we are to be a world leading innovation partner. In order to be this, we firstly have to define what this implies, with consideration to the conditions we operate with," says Pia Wågberg, who has acted as the Manager for developing an innovation strategy for Innventia.

"The result of our strategy work came up with three areas for us to focus on. The first is that we will look at how we can improve our own innovation climate, here at Innventia. This deals a lot with culture, structure, processes, definitions and tools. It is vital to have common terminology and terms of reference."

The second area of focus deals with

the commercialisation of results that come from research work. This might concern results from research done by Innventia, e.g. SOFA, which is currently going through a VINN Verification Project, or results from collaboration work carried out with a university or an institute of higher education.

The third area, but by no means the least, is to investigate new business possibilities, together with customers, with the Innventia contract customers having priority. How can we help customers to generate new value with the conditions they operate with, from both a technical and commercial perspective?

Pia Wågberg says, "When it comes to the commercial point of view, we've entered into a strategic collaboration with Googol that possesses expertise in this area."

Pia continues, "Our core operations mostly deal with technical knowledge and know-how. However, to develop and

understand how we could be a consumer innovation partner to our customers, we have to be better at understanding the conditions of the market. Still, this is a balancing act, since the closer you come to the commercial product, the closer you come to our customers' core operations. Our aim is to assist our customers in generating new value."

As a tonic for Innventia working with innovation from various aspects, Pia has been given the opportunity of spending four months in Silicon Valley in the USA, thanks to a VINNOVA scholarship she was awarded. She is going to work at an entrepreneurial institute and will also make new contacts with several other parties that are in her field of interest. ●

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Innventias innovationsstrategi

inriktar sig på tre fokusområden. Det första rör det interna innovationsklimatet där det gäller att förbättra kultur och struktur, processer, definitioner och verktyg. Det andra fokusområdet handlar om att kommersialisera forskningsresultat. Det kan vara resultat från Innventias egen forskning eller från samarbeten med universitet och högskolor. Det tredje området är att tillsammans med kunderna undersöka nya affärsmöjligheter.

– Vår kärnverksamhet ligger mestadels i det tekniska kunnandet men för utvecklas och förstå hur vi ska kunna vara en fullvärdig innovationspartner för våra kunder måste vi bli bättre på att förstå marknadsvillkoren, säger Pia Wågberg.

To coordinate is to manage developments

A coordinator of EU Projects

For many years, Innventia has worked hard and successfully, not only to participate in EU Projects but also to manage and coordinate them. A coordinator has the opportunity of influencing the direction of developments, by putting together partners and the basis for decisions.

“We must be present in this arena and show that we are a leader. Then we’ll have access to the very best available,” explains Catharina Ottestam, Manager of the EU Office at Innventia.

In an EU Project, there are several partners, for example, institutes, universities, technical universities and companies, each of which has its own undertaking. All of them have their own piece of the puzzle in the project, apart from the mutual business relations.

“It’s a neutral work arena for making new contacts. As a partner, you gain access to an extraordinary network that you’d never have had otherwise, without being dependent on each other, as in a customer/supplier relationship, for instance,” continues Catharina.

“We must be present in this arena and show that we are a leader. Then we’ll have access to the very best available.”

Through its own network and other specialists, customers and partners from many parts of the world, Innventia can offer a very good prospect for managing big projects. Behind every project, however, there lies extensive work before an application has been approved at all levels. This is the reason why a part of the SK Funding is invested in working to produce new ideas for projects and networks. I-Bulk and LigniCarb, which are described below, are two results from such work.●

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I-Bulk fills paper with many functions

Today, many packaging ideas and concepts for certain demanding applications

are based on plastic made from non-renewable raw materials. Due to the character of paper, particular wished-for combinations of properties have not been achievable. The project I-Bulk aims at radically improving the material properties of paper and board products. With improved properties, such as strength and bulk, the need for material can be reduced and new renewable products can be developed.

Perhaps a more striking goal is to verify ideas, so as to introduce new functions into fibre-based materials. Examples of such in-built functions are fragrances, being fireproof and aspects of security.

Kristina Wickholm, the Project Manager, comments, “Multi-functional materials are an enormous challenge. There’s a lot to get your teeth into, especially when it comes to the various parameters of processes. But, if we succeed, these new materials will lead to completely new products.”

“Our aim is to produce two demonstration products that will show evidence of these possibilities.”

The Project I-Bulk is financed by the Sectoral R&D Programme for the forest-based industry and by parts of Wood-Derived Renewable Materials, an Innventia Cluster. It is also the basis for a project application to the EU.●

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New carbon fibre from the forest

One line of pursuit in the Biorefinery (see page 6) is to use lignin as a raw material for producing carbon fibre. If this were possible, which researchers are considering, the benefits would be many. Firstly, it would be possible to replace a petro-based raw material with a renewable one. Secondly, there could be an increase in demand. Thirdly, it would mean a new product that has high conversion value for the forest industry.

LigniCarb, a VINNOVA financed project, started in 2009 with companies from the Innventia Biorefinery Cluster as project partners. The aim of the project is to demonstrate that lignin can be used for the production of commercial-quality carbon fibre.



Innventia has invested in equipment for spinning lignin fibre and a furnace for carbonising the fibre. This kiln is also being used for producing activated carbon in another Innventia project.

“Making high quality carbon fibre is one of the biggest challenges. Yet we think that it’s entirely possible with a lignin that has been produced using a modified LignoBoost process,” states Karin Lindgren, the Manager of the Wood Derived Chemicals Group.

Elisabeth Sjöholm, the Project Manager of LigniCarb, agrees. “We’ve come quite a way, when it comes to the character of the fibre; that it has a smooth surface and doesn’t contain any cavities, for instance. Besides of these criteria, the following stabilising stage is especially important for further processing. It is a technically difficult phase, in which the lignin fibre is changed from a plastic state into a thermoset. In other words, it must be possible to treat the fibre, without it melting away.”●

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 **Innventia har** i många år arbetat hårt och framgångsrikt för att inte bara delta i utan också leda och koordinera projekt. Bakom varje större nätverksprojekt ligger dock ett omfattande arbete innan ansökan blivit godkänd i alla instanser. Därför satsas en del av SK-medlen på detta arbete. I-Bulk och LigniCarb är båda resultat av sådan satsning.

I-Bulk syftar till att radikalt förbättra materialegenskaper för pappers- och kartongprodukter, samt verifiera idéer för att föra in nya funktioner i fiberbaserade material. Detta är av speciellt intresse för förpackningsbranschen.

Tack vare en modifierad LignoBoost-process finns nu ett lignin som är så rent att det har stor potential att användas för framställning av kolfiber av kommersiell kvalitet. Målet för LigniCarb är att demonstrera detta.



Strategic venture capital testing quality of research ideas

Anders Pettersson
Senior Vice President, Research

Beyond readers have become used to reading articles about current or recently completed R&D projects that are wholly or partly financed by the industry. However, behind several of these projects, extensive preparatory work has to be carried out, even before a proposal for a project has been presented to our customers. In many instances, this work is financed to a large part with public strategic funding for competence development, called SK Funding.

With the funding we receive from the Swedish Government through RISE, Research Institutes of Sweden, it is possible for us to generate new ideas and test them in the pre-study stage. This facilitates the taking of risks and the carrying out quality control, before going out

with proposals for projects to industrial customers and/or public financiers.

It is in the interest of Innventia to invest in projects that provide a large potential for exchange to the industry.

In our business sector, the situation of the world around is characterised by a list of challenges, such as:

- the need for conversion to new products and ways of working
- the continuing high cost of energy and raw materials
- difficulty in obtaining enough payment for many existing products
- a strong dependency on heavy capital investments and large production volumes
- a limited ability to innovate
- difficulty in attracting the very best

students from universities and institutes of higher education.

As a result of these things, it is especially important to venture into significant strategic areas that involve great leaps in developments and, as a result, new business possibilities for those lines of business.

Examples of operations that have gone from an idea, via strategic competence development funding, to a noteworthy business for both the industry and Innventia, are our biorefinery operations, where we currently run a large Research Cluster, a Project within the Sectoral R&D Programme for the forest-based industry, participation in a big EU Project and the carrying out of extensive commissioned work. Many companies see a great deal of potential in the Biorefinery. Read more about this on page 6.

Described below are some current spheres of investment that are within the Innventia strategically prioritised areas, where, with SK Funding as venture capital, we are testing ideas that we consider of interest both to our customers' and to our operations. ●

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Tools for measuring, evaluating & predicting sustainability



Innventia's Product Performance From a Sustainability Perspective Project is a strategic expertise and skills development project endeavouring to make analyses and tools for sustainability more available to customers and, in so doing, increase their competitiveness on international markets. Marie-Claude Béland is the Project Manager.

"Today, we have a lot of expertise that can contribute to the evaluation of sustainability. However, our efforts are dispersed and would benefit from having a unified direction."

"We are developing sustainability modules where we, together with our customers, can choose the expertise and tools that best meet the sustainability evaluation needs. We are also looking at what is being done worldwide in this area."

Module examples include LCA, Consumer Insight, Packaging Development and Print. To demonstrate the system, two pilot cases were carried out. One investigated different aspects of whiteness of office papers and the other studied how printed packaging surfaces are affected by transport and how visible damages can affect customer attitudes.

The project is running from 2009 to 2011. In 2010, work will continue on the modules and include foresight and consumer studies using eye-tracking. ●

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Projektet Produktprestanda

från ett hållbarhetsperspektiv strävar efter att göra hållbarhetsanalyser och verktyg mer tillgängliga för kunderna och därmed öka deras konkurrenskraft på internationella marknader. Många av Innventias befintliga verktyg och metoder kan genom att kombineras skapa en mer heltäckande bild och därigenom användas för hållbarhetsutredningar.

– Vi vill marknadsföra vårt hållbarhetserbjudande i ett modulsystem där vi tillsammans med kunden kan välja de kompetenser och verktyg som bäst täcker deras behov för att göra hållbarhetsutvärdering, säger projektledaren Marie-Claude Béland.

Tissue Cluster starting up



Today, making efficient use of available resources in the pulp and paper industry, such as fibres and energy, is an urgent matter, world-wide. In many parts of the world, there is a lack of available traditional paper-making fibres, while standards of living and the demand for hygiene products are rapidly increasing. This will require the efficient use of certain available fibres for a particular product. There will also be a great need to develop production processes that use less energy in all areas.

Moreover, the tissue market in the western world is close to saturation and competition among producers and retailers is strong. Softness has become an important property among brand-name products. Absorption is another important quality parameter for many products. In Europe, there is a focus on products that are not branded, so called

private label products. These are sold by low-price, large retail chains.

This development has put a lot of pressure on prices and production costs. Therefore the aim is to retain the same important properties, while using fewer fibres or alternative production processes.

These challenges will be met in a new Research Cluster starting in March 2010. In this Innventia Cluster, existing and modified fibres will be evaluated in terms of their energy usage. In addition, new methods for characterising sheet structure and absorption behaviour will be evaluated.

The novel approaches to be used include high speed infrared thermography for dynamic absorption measurements, x-ray computer tomography for sheet structure analysis, surface topography analysis, using the OptiTopo meth-

od, and pore volume analysis, using the TRI method. ●

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I slutet av mars startar ett nytt forskningskluster vid Innventia med fokus på Tissue. Drivkraften bakom denna satsning är sviktande råvarutillgång i kombination med ökad efterfrågan i takt med stigande global levnadsstandard. Målet är nya tillverkningsprocesser med lägre resursutnyttjande utan försämrade produkttegenskaper. I klustret kommer existerande och modifierade fibrer att utvärderas i termer av energianvändning liksom metoder för karakterisering av arkstruktur och absorptionsförmåga. För dessa ändamål används bl a en infraröd höghastighets värmekamera, röntgentomografi samt metoderna OptiTopo och TRI.

Interdisciplinary generation of ideas for sustainable packaging materials



With the aim of producing ideas for possible new R&D work directed at sustainable packaging materials, twenty-two chosen representatives from the three divisions at Innventia gathered for a seminar and workshop in November 2009. The overall purpose of creating this mix of experts from different areas of competence was to increase the possibility for cross-boundary ideas that would utilise the specialist knowledge that exists throughout Innventia.

As an extra stimulation for generating ideas, the participants were able to listen to inspiring presentations by five invited representatives from different parts of the packaging chain, from the producer of materials to the end-user in the retail sector. These representatives talked about their views on developments and what the market is demanding.

The Generation of Ideas was led by Dariush Ghatan from Googol, an innovation and business development company that Innventia collaborates with in "innovation services and opportunity scouting". The result of this Generation of Ideas was slightly more than 250 suggestions, of which 200 involved concrete ideas for projects. Certain ideas were selected and taken another step further for deeper analysis, which took place in groups. These ideas were also processed in a new evaluation tool being tested at Innventia.

Lennart Salmén, who was the Project Manager for the work on generating ideas says, "At the moment, we are working with five interesting large scale ideas that are being evaluated in order to be able to go ahead with concrete projects in 2010." ●

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Med målet att ta fram uppslag till tänkbara nya verksamheter rörande hållbara förpackningsmaterial samlades 22 utvalda representanter från Innventias olika divisioner till ett seminarium och workshop i november 2009. Som inspiration fick deltagarna lyssna till fem inbjudna representanter från olika delar av förpackningskedjan, från materialtillverkare till slutanvändare på butikssidan, som berättade om sin syn på utvecklingen och marknadens krav. Idégenereringen resulterade i cirka 200 konkreta projektidéer.
- Just nu arbetas med fem större idéer som värderas och beskrivs för att kunna köra igång 2010, berättar Lennart Salmén.

Hemicellulose from wood and black liquor has a lot of interesting properties and several possible areas of application, such as barrier films, hydrogels, sweeteners, lactic acid or as a binding agent for the improvement of surface charging on fibres.

Gel of nanocellulose

New areas generate new business

For pulp and paper producers, it has become all the more important to find new business opportunities as a complement to their traditional product range. A significant aim, therefore, is that investments in new strategically important fields of research, as set out in the previous pages, will lead to commercialisation.

Biorefinery

Wood-based biorefinery is founded on the idea of utilising all the flows in a pulp mill for different purposes, in conjunction with the production of pulp. Today, many operations at Innventia are connected in some way to the biorefinery and its business possibilities. Peter Axegård, Director of the Fibre, Pulp, Energy and Chemicals Division, considers that finding the right separation processes has been decisive for this development. As an example, he mentions the LignoBoost technology that was developed to relieve pressure on the recovery boiler in pulp mills, by extracting lignin from black liquor. The lignin that has been extracted has proved to be very useful in various ways.

“In the short term, the lignin can replace fossil oil in lime sludge reburning kilns, for instance. Or it can be used as a dispersal agent in asphalt emulsions, among other things. Akzo has tested several hundred tonnes of lignin that we’ve supplied. They are very pleased with the result,” says Peter.

He goes on, “And in the long term, lignin could be interesting for use as a replacement for phenol-formaldehyde in bonding agents, in the conversion

to active carbon, as a raw material for carbon fibres and the large-scale production of phenols and other aromatic hydrocarbons. Lignin could very likely be interesting as an additive to sawdust or straw pellets.”

Innventia has also developed processes that appear to be technically, financially and economically appealing for the extraction of hemicellulose from wood and black liquor. Apart from the main lines of inquiry into lignin and hemicellulose, there are also processes for extracting substances from birch bark, such as betulin (a white pigment) and suberin (functionalised fatty acids). There are several projects being carried out in this area.

Peter adds, “Last but not least, we have a way of producing ethanol with the pulp processes as the basis and, in the long run, special cellulose and sulphur-free lignin from wood residues, bagasse etc. These processes are very easy to implement as an extra process, in a resource efficient way in a pulp mill.” ●

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Nanocellulose

Another new business possibility for raw materials from the forest is the materials and products from nanocellulose or microfibril cellulose (MFC), as it is also called. MFC, as such, is not new, but its production has always been connected with extremely high energy usage.

“Here, at Innventia, we’ve now shown that we can produce MFC on a large scale, while succeeding in reducing the energy usage involved by 98%. Quite suddenly, there are processes that make

the production of MFC possible and at an attractive price,” says Mikael Ankerfors, who is Manager of several projects including an EU Project in this particular field.

According to Mikael, there is a lot of interest here, for example, the forest industry that is looking for new products from forest raw materials, while, at the same time, wanting to improve on the properties of its traditional paper products. Then there are those in the composite material chain who see MFC as an interesting raw material, with which to strengthen bioplastics, to give one example.

Mikael goes on to explain, “When it comes to the application of MFC in composite materials, this concerns a very multifaceted market, involving large and small sized companies. On one side, there are the forest companies, for instance, while, on the other side, there are the users of plastics. Among them is a quantity of producers, often small, that produce different components. Today, there is no natural connection between the forest industry and, for example, Sony Ericsson that uses composite materials in its telephones.”

The SustainComp Project that Mikael is coordinating is endeavouring to find the best application from all the hundreds of possible ones available and to produce a high quality product. Examples of applications are strengthening components, foodstuffs, security solutions in paper and pharmaceuticals, together with membranes for filtering substances in the body.

Mikael concludes, “We’re working with many partners to find out where it’s possible to work with these.” ●

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Två högtintressanta områden

där forskningen har stora möjligheter att leda vidare till kommersialisering är vedbaserat bioraffineri och nanocellulosa.

Bioraffineriet grundar sig på idén att utnyttja alla strömmar vid sidan om massaframställningen för olika ändamål. Att hitta bra separationsprocesser, som LignoBoost, har varit avgörande för utvecklingen. Innventia har även intressanta processer för uttag av hemicellulosa från ved/svartlut och substanser från björkbark samt ett sätt att med massaprocessen som bas tillverka etanol.

En annan ny affärsmöjlighet för skogsråvaran är material/produkter från nanocellulosa (MFC), som dock alltid förknippats med extremt hög energiförbrukning. Innventia har nu demonstrerat sänkt energiförbrukning med 98% vid storskalig produktion av MFC. Detta gör MFC intressant för bl a nya kompositmaterial.

SK Funding provides collaboration in R&D for trade and industry

RISE Research Institutes of Sweden Holding AB



"We've interpreted the task we've been given by the government as one in which we must build up the research work that's needed for today's trade and industry and for that which doesn't yet exist," says Peter Holmstedt, President of RISE, a public holding company. "We consider that companies need institutes and universities that collaborate together. So, we're trying to contribute to that development. Most of all, we want to use the funding and resources available to us to develop the expertise of institutes on a long-term basis."

Peter points out that the financing of research work has partly contributed to short-termism. Money for projects and competitiveness among institutes and universities have not engendered the long-term development of expertise that Swedish companies would benefit from.

"We've therefore directed the strategic funding for competence development (SK Funding) at the boards of institutes," Peter continues. "They know best what their institutes need to develop strategically. The SK Funding is "unmarked" up to eighty percent. The remaining twenty percent can be spread by an institute over at least two out of four areas, of which cooperation in the institute sec-

tor has to be one of them. The others are collaboration with SMEs, collaboration with universities and institutes of higher education as well as an area of free choice." ●

Wallenberg Wood Science Center: Adding further to long-term collaboration



Lars Berglund, a coordinator at the Wallenberg Wood Science Center (WWSC) at the Royal Institute of Technology (KTH) states that Innventia and KTH have a long history of extensive collaborative work in several fields and that SK Funding has generated opportunities for extending and expanding this.

"It is important to know that we're entering into collaboration with a partner that is long-term," Lars explains.

The aim of the WWSC is to make better use of the wood raw material by developing new materials, such as biocomposites, among other things.

Lars continues, "It's an advantage for us that, through Innventia, we have access to research scientists who are experts at cellulose and cellulose nanotechnology. Innventia also possesses extensive knowledge and know-how about processes. One aim is to utilise the flows in pulp mills that already exist

and modify them to produce new materials. This is where collaboration with Innventia will mean a great deal." ●

The University College of Arts, Crafts and Design New collaboration with enormous potential



"We want to give our students the chance of using the most advanced materials that there are," says Ronald Jones, Professor and Manager of the Experience Design Group (EDG) at the University College of Arts, Crafts and Design. The collaboration that is being built up with Innventia provides us with this opportunity. I think that this collaboration has been a huge success so far."

The cooperation on research work across many disciplines has generated new possibilities. However, the creation of a common language and terms is a prerequisite for success.

"This requires the putting in of a great deal of work and involvement," explains Ronald. "Mikael Lindström at Innventia has contributed a lot by studying design and then lecturing at the University College of Arts, Crafts and Design. He has built up the students' knowledge and know-how about new materials." ●

COMING EVENTS

APRIL

- 13 Miljöpack Annual meeting
- 16 Defense of dissertation: Karin Almgren
- 20-21 Packaging education

MAY

- 17-20 Packaging Diploma Course, session II
- 19-21 EARTO Annual Conference (www.earto.eu)

SEPTEMBER

- 15-17 Control Systems 2010
- 20-21 Research Seminar for Innventia Partner Customers

For further information on coming events, see www.innventia.com



Packaging education

20 - 21 April, 2010, in Kista, Stockholm

www.innventia.com/forpackningsutbildning
(course language: Swedish)

Conferences 2010-2012:

- Annual Research Seminar for Partner Customers
- Control Systems 2010
- 3rd Nordic Wood Biorefinery Conference 2011
- International Paper Physics Conference 2012
- 8th International Paper and Coating Chemistry Symposium 2012

See www.innventia.com

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B



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Lydia Capolicchio and Gunnar Svedberg

Hans-Peter Sollinger

Jouko Karvinen

On 21 January, 2010, the newly extended pilot facilities at Innventia were inaugurated. Partners from the industry, academia and financing bodies took part in this festive occasion to celebrate the new innovation centre. During the afternoon, they could listen to Jouko Karvinen, CEO at Stora Enso, Hans-Peter Sollinger, President at Voith Paper, Charlotte Brogren, Director General of VINNOVA and Daniel Söderberg at Innventia. Read more about the new facilities at www.innventia.com/fex.

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