VIPP VALUES CREATED IN
FIBRE-BASED PROCESSES
AND PRODUCTS

THE VIPP NEWSLETTER #4

APRIL 2013

THE INDUSTRIAL GRADUATE SCHOOL VIPP HAS BEEN FULLY OPERATIVE WITH **14 DOCTORAL STUDENTS SINCE APRIL 2012**, I.E. IN APPROXIMATELY ONE YEAR.

We can now observe how the doctoral students are producing and submitting manuscripts for publication in journals or for conference presentations. At the same time, discussions with the doctoral students clearly show that the doctoral students have start to acquire the ability to act as "border commuters", researchers that switch freely between industry and academia and are able to understand industrial needs and demands and to propose solution by formulating the problems in terms of adequate research problems. The background of the doctoral students was different at the point of time they became enrolled at Karlstad University. Some of the doctoral students had quite a long experience of industrial R&D while other came directly from university studies. At the end of the Industrial Graduate School VIPP, I am convinced that all 14 doctoral students act as "border commuters" in a superior manner. The Industrial Graduate School VIPP is clearly making progress and is moving in a positive direction.

The progress of the industrial graduate schools that started during 2011 has also been recognized by the funding organization the Knowledge Foundation. The Industrial Graduate School VIPP has now been invited by the Knowledge Foundation to apply for additional doctoral projects within the existing graduate school. Companies that are interested to participate in this application are welcome to contact us. A simplified application has to be submitted to the Knowledge Foundation by mid of May.

Prof Lars Järnström, program director
of VIPP Industrial Graduate School

VIPP stands for Values created in fibre-based processes and products and is an interdisciplinary industrial graduate school located at Karlstad University.

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KK-stiftelsen

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“A SUPERVISOR’S ROLE IS TO GIVE SUPPORT AND ENCOURAGEMENT”

All doctoral students at VIPP Industrial Graduate School have supervisors at Karlstad University as well as mentors at the companies.

Caisa Johansson is one of the supervisors and an associate professor in Chemical Engineering.

Foto: Maria Obed

- A supervisor’s major role is to support the doctoral student to develop as an independent researcher. The supervisor should also ensure that the research within the project meet all qualitative and quantitative requirements that are set by the scientific community. On a daily basis, it´s about encouraging the student to stay on track!

- The VIPP project provides a unique opportunity to develop a more close collaboration between academia and industry. The integrated projects enable a research focus that is of high relevance to the industrial challenges encountered by the involved companies and also allows for technically applicable solutions to be jointly developed. From a supervisor´s perspective, it is however challenging to comply with the company´s business goals without compromising with the academic requirements on research quality. It is also important to understand each other´s drives.

Christophe Barbier is also a supervisor and associate professor in Chemical Engineering. He agrees with Caisa Johansson that the most important role is to assist the doctoral student to become a fully fledged researcher.

- The role of the supervisor is to assist the doctoral student in shaping and conducting research. It consists of guidance and feedback with focus on improving the doctoral student’s work and ensuring that the work performed in a self-governing way meets the standards set by the examiner.

- The VIPP projects are both challenging and exciting. It’s exciting, because we are working on very tangible problems formulated in close cooperation with companies. Questions with relevance for Swedish industry are discussed and solutions to solve these rise in the meetings with Karlstad University’s researchers. It’s challenging also, because there are risks of misunderstanding when different interests are represented. Our doctoral students are still learning to perform research. This is a process which needs to take time. Meanwhile the economic reality in the partner companies steers the need of a fast “return on investment. The main challenge in the VIPP projects is to be able to satisfy the criteria for excellent research and to balance the requirements from the partners.

“WE STRONGLY BELIEVE IN THIS RESEARCH COOPERATION”
Industry mentor Ann-Kristin Magnusson is a development engineer in environment at Stora Enso. She points out that industrial research is an important part of the company’s development.

The Industrial Graduate School VIPP, gives us the opportunity to exchange experiences with the university as well as other companies. Industrial research is interesting because it’s about implementing new knowledge and results where they are useful straight away. Through participating in VIPP, we hope to learn more and gain knowledge about new processes.

- To us it’s important to move forward in the area of energy efficient waste water treatment. We use a large quantity of water at the paper mill Skoghalls Bruk to manufacture pulp and cardboard and sustainability is a key issue to us. We hope that the dissertation project we’re involved in will lead to proposals and ideas on how we can develop our processes and invest in new technology for a better and more energy efficient waste water treatment. We strongly believe in this research cooperation, says Ann-Kristin Magnusson.

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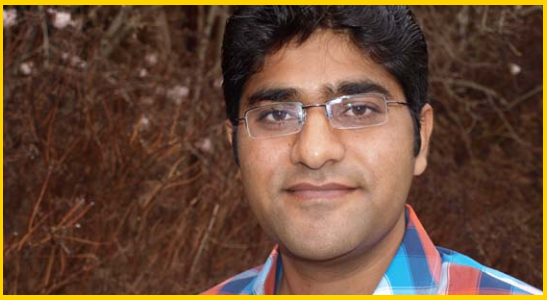
RENEAWABLE PACKAGING MATERIAL

Today's materials used for food packaging are mostly oil-based polymers as barrier materials. Over the last ten years efforts has been made to replace the oil-based polymers with environmentally friendly bio-based polymers, keeping in mind the recycling and reuse of food packaging material. The purpose of barrier material is to protect the packaged food from oxygen, water vapour, water and fat. Oxygen facilitates oxidative reactions of food and can cause reduction of the shelf life of the packed food. Development of odour, off-flavours and colour changes can also occur when oxygen enters packed food.

Starch derivatives have shown good barrier properties against oxygen and fat at low relative humidity. The aim with this project is to generate knowledge about starch based barriers and their application under controlled experimental design and conditions. Introduction to some experimental techniques was done which was supposed to be used in this project, for instance starch cooking, blending with other polymers, crosslinking of starch/polymer blends, solution characterization, paper coating at laboratory scale, casting of free films, characterization of coated board and free films and measurement of barrier properties.

Study of starch/polymer blends was done during the year 2012. Experimental work plan was set up to study the starch/polymer blends and effect of cross-linking on oxygen barrier properties at medium and high relative humidity.



Name:	**Muhammad Asif Javed**
Company:	**MSc Chemical Engineering, 2011, Karlstad University**
Supervisors:	**Associate Professor Caisa Johansson**
Assistant Supervisor:	**Henrik Ullsten**
Examiner:	**Professor Lars Järnström**

KORSNÄS

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DESIGN AND UTILIZATION OF A HIGH SPEED CREPING SIMULATOR FOR TISSUE

Creping is a process where dried tissue is separated from the surface of the Yankee cylinder with the help of a doctor blade. Yankee dryer creping of lightweight tissue sheets is used extensively in the paper business to affect softness and bulk of bath tissue, facial tissue or towel products.

Critical to the creping operation are among others the strength of attachment of the tissue sheet to the Yankee dryer (adhesion) and the angles and forces exerted on the sheet during the creping operation. Higher adhesion typically translates into higher creping energies and higher bulk and better softness. Higher speeds and tighter angles also influence the resulting properties of the creped sheet. Typical production tissue machines operate at speed over 1000 and up to 2000+ m/min.

Trials on production tissue machines are coupled with potential difficulties because they jeopardize a critical piece of production equipment (the Yankee dryer) that is both very difficult to repair and very time consuming to replace. This problem is especially evident when the trial incorporates unknown parameters (typical for research questions) where the trial outcome might jeopardize the structural integrity of the equipment.

In these cases, the first stage evaluation on a simulator or a pilot line is especially advantageous. Normally creping evaluations start with handmade sheets and stationary (or very slow) sheet drying and creping, and progress to faster operations once trials results become known. Nevertheless, any trial evaluations that are performed with processes that are only estimates of commercial operations or are performed at speeds that are orders of magnitude slower than commercial operations are suspect with respect to their applicability to commercial operations. Therefore, there is a need to a pilot line creping simulator that incorporates close similitude of commercial equipment at speeds commensurate to commercial speeds.

During spring designing will be completed and fabrication of the creping simulator begins in the early summer. Simulator will be installed at Karlstad University on autumn. Meanwhile, a macroscopic study will be carried out on adhesion build up between two surfaces: adhesive chemical and paper/metal surface. Within this field, it is especially interesting to investigate how fracture occurs at different well-controlled loading modes. While pure tension is easy to investigate, loadings in shear, which are more relevant for the creping process, have not been completely investigated yet.

Name:	**Pyry Hämäläinen**
Education	**Master of Engineering in Paper Technology, HM Germany**
Company:	**Kemira**
Project start:	**February 2012**
Supervisors:	**Associate Professor Nils Hallbäck, Karlstad University**
	Dr. Christophe Barbier, Karlstad University
Examiner:	**Professor Lars Nilsson, Karlstad University**
Mentor	**Henry Skoog, senior research scientist, Kemira**