

Forest Cluster Doctoral Program

Metsäklusterin tohtoriohjelma



PROGRAM REPORT 2012-2015

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ISBN 978-952-265-822-7
ISBN 978-952-265-823-4 (PDF)

Lappeenrannan Teknillinen Yliopisto

Digipaino 2015

Forest Cluster Doctoral Program

Program Report 2012 - 2015

Lappeenranta University of Technology

Aalto University

Forestcluster Ltd (- 20.8.2012) => Finnish Bioeconomy Cluster FIBIC Oy (21.8.2012 -)

University of Jyväskylä

University of Oulu

VTT Technical Research Center of Finland

Åbo Akademi University

The Program Report of the Forest Cluster Doctoral Program (FCDP, formerly the Forest Cluster Graduate School, FCGS) introduces the activities during 2012 - 2015, and reviews the progress of doctoral students of the program.

Keywords in English

Forest cluster, Wood processing, Forest industry, Multidisciplinary, Doctoral studies alongside work, Industrial cooperation, Academia cooperation, Doctoral program, Industry and commerce, Integrated biorefinery, Pulp and Paper Technology, Fiber and paper physics, Forest products chemistry, Material science, Customer solutions, Business economics, Industrial automation, Sustainability

Avainsanat suomeksi

Metsäklusteri, Puunjalostus, Metsäteollisuus, Monitieteisyys, Tohtoriopinnot työn ohella, Teollisuusyhteistyö, Yliopistoyhteistyö, Tohtoriohjelma, Elinkeinoelämä, Integroitu biojalostamo, Selluloosa- ja paperiteknologia, Kuitu- ja paperifysiikka, Metsätuotteiden kemia, Materiaalitiede, Asiakassovellukset, Liiketalous, Teollisuusautomaatio, Kestävä kehitys

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Preface

The Forest Cluster Doctoral Program (FCDP) was established in 2008 and offers doctoral education to professionals who wish to study alongside their work. In many respects, the last operational period 2012-2015 was also a successful one for FCDP. It was dominated, in spite of the limited predictability of the economic situation of the Finnish industry and university system during the past few years, a hopeful and energetic atmosphere, and the students as well as their individual supervisors have showed commitment to the ambitious time limits for doctoral studies. In practice, versatile activities, especially in the form of seminars, virtual researcher meetings, and writing tubes were organized by the FCDP coordinator. The best indication of this favorable and extensive development is culminated in the fact that during the year 2015 the first three students will have their public defenses.

The year 2015 is also practically the last official one in the lifecycle of FCDP. For this reason, one of the most important challenges of the following near years would be to support by the partnering universities all the FCDP students for achieving their common target. However, besides numerical goals, we consider that qualitative goals including the original focus in the development of postgraduate education are generally also very important and particularly these aims have motivated the FCDP activities. This doctoral program has, for its part, clearly showed that the objectives and means, which served us well in the past in postgraduate education and research, may not necessarily be effective in all cases in the present day. We hope that the new, open-minded approaches like those applied in FCDP would be an illustrative example to enlarge our postgraduate teaching better suited for the modern world. Finally, I want to extend my sincere thanks to the students and the management committee and, especially to the FCGP coordinator, Dr. Terhi Virkki-Hatakka, for the excellent work.

Raimo Alén

Chairman of the FCDP Steering Group

Introduction

The Forest Cluster Doctoral Program (FCDP), originally named Forest Cluster Graduate School (FCGS), has been a trailblazer as multidiscipline doctoral programme targeted for people studying alongside their work in forest industry. In this field, high-level research has been recognized as a key factor in R&D and competitiveness. Another important aspect is that in international business the experts who are dealing with business often have a doctoral degree.

Traditionally, doctoral studies have been considered a patent way of training researchers. In practice, the completion of a doctoral degree has largely involved acquiring in-depth knowledge of one's own field, but it also forces one to look at matters from various perspectives and encourages searching for novel solutions. Such promotion of problem-solving skills and innovativeness is required not only in research and development, but also in a number of other professional areas.

The project started at the end of 2008, financed by the partnering universities. The aim was to support and boost the doctoral studies of people who are working alongside their doctoral studies either in a company or in other projects from which they receive remuneration. A small, heterogeneous group of talented students, who had an appropriate research topic at the university, financing from their employers or another external source, and high motivation, was accepted into the program. Regular meetings, the support of a supervisor and peer group, and the functional coordination of studies helped students to pace their studies and made headway with their dissertations.

In the first years of FCDP, the programme offered generic courses suitable for doctoral students of all disciplines, and theme seminars about topical questions among forest industry. During 2012-2014, along the progressing studies of doctoral students, the programme actions focused especially on supporting scientific writing in practice which seemed to be a kind of bottleneck in many cases.

The programme ended officially on 2014, but the peer group still continues supporting each other. The first dissertations from the group will be seen in 2015.

The feedback questionnaire among different actors involved in FCDP on winter 2015 pointed out, that this kind of actions are needed also in the future. Hopefully the results gained in this programme will help other similar kinds of programmes to develop their curricula and efficiency.

Metsäklusterin tohtoriohjelman suomenkielinen yleisesittely

Monitieteinen metsäklusterin tohtoriohjelma (2008-2014) on yhdistänyt useita metsäklusteriosaamiselle merkittäviä tieteenaloja. Hankkeessa ovat olleet mukana Lappeenrannan teknillinen yliopisto, Jyväskylän yliopisto, Oulun yliopisto, Aalto-yliopiston Teknillinen korkeakoulu, Åbo Akademi, VTT ja FIBIC Oy (aiemmin Metsäklusteri Oy).

Hanke on poikennut muista verkostomaisista tohtoriohjelmista näkyvimmin siinä, että sen keskeisenä toiminta-ajatuksena on ollut edistää erityisesti työelämässä toimivien tohtoriopiskelijoiden jatko-opintoja. Ohjauksen tarve on erilainen työelämässä olevilla kuin päätoimisilla jatko-opiskelijoilla ja ohjelman eräänä tavoitteena onkin ollut se, että opiskelijoille syntyisi luonteva tapa olla säännöllisessä kanssakäymisessä tiedeyhteisön kanssa. Lisäksi opiskelijoiden tieteellisiä perusvalmiuksia pyrittiin vahvistamaan erityisesti opintojen alkuaikoina.

Metsäklusterin tohtoriohjelman toiminta suunnattiin metsäteollisuudessa esimerkiksi tutkimus-, asiantuntija- ja kehitystehtävissä työskenteleville heidän erikoistumisalastaan riippumatta. Tavoitteena oli, että opiskelijat voivat tehdä väitöstutkimustaan työnsä ohessa ja selkeästi yritystä kiinnostavasta aiheesta mihin tahansa mukana olevaan yhteistyöyliopistoon. Tohtoriohjelman monitieteisyys sekä kiinteä yhteys yritysmaailmaan mahdollisti jatkuvan ja hyödyllisen poikkitieteellisen vuoropuhelun syntymisen erilaisista ammatillisista substanssitaustoista tulevien opiskelijoiden välille.

Tohtoriohjelman kauaskantoisena tavoitteena on ollut vahvistaa kansainvälisesti korkeatasoista metsäklusterin osaamista, jolla halutaan varmistaa alan globaali kilpailukyky ja strateginen huippuosaaminen myös tulevaisuudessa. Ohjelma pyrki omalta osaltaan vastaamaan metsäteollisuuden rakenteen muutoksiin kouluttamalla laaja-alaisesti poikkitieteellisiä osaajia. Hanke on käynnistynyt loppuvuonna 2008 partneriyliopistojen rahoittamana ja alun perin siihen otettiin 14 jatko-opiskelijajäsentä. Ensimmäiset ohjelmassa mukana olleet tohtorit väittelevät vuonna 2015.

Metsäklusterin tohtoriohjelma on tukenut opiskelijoita mm. orientaatiojaksolla, erilaisilla luennoilla ja seminaareilla sekä kirjoitusputkilla. Opiskelijat ovat saaneet uusimman tiedon lisäksi välineitä ja tukea jatko-opintojensa tekemiseen. Systemaattinen tohtoriohjelma on auttanut opintojen suunnittelussa ja valmistumisessa. Virtuaaliset oppimisympäristöt ovat antaneet opiskelijoille mahdollisuuden tavata riippumatta siitä, missä päin maailmaa he tällä hetkellä opiskelevat.

Talvella 2015 tehdyn palautekyselyn perusteella hankkeessa mukana olleet toivovat vastaavaa toimintaa kehitettävän työn ohella opiskelevilla tohtoriopiskelijoille myös jatkossa. Toivottavasti tässä hankkeessa saadut tulokset voivat osaltaan hyödyttää muita ohjelmia, jotka tähtäävät työn ohella tohtoriopintojen tekemisen tukemiseen.

Forest Cluster Doctoral Program description

The multidisciplinary Forest Cluster Doctoral Program has been a new type of doctoral program connecting areas of importance to the forest cluster. The organizations involved include Lappeenranta University of Technology, the University of Jyväskylä, the University of Oulu, Aalto University, Åbo Akademi University, VTT and FIBIC Oy (formerly Forestcluster Ltd). The project was coordinated by LUT.

The most marked difference compared to traditional doctoral programs has been that this project aims to promote postgraduate studies of doctoral students already in the world of work - an issue that has often been tackled inefficiently in the prevailing system. Working part-time students have different needs regarding supervision than full-time doctoral students do. To this end, the doctoral program aimed to establish a natural, regular means of interaction between its students and the scientific community. Moreover, the knowledge and skills required for scientific work have been honed from the very start.

The FCDP was targeted for employees in research and development positions and tasks requiring expertise in the forest industry, regardless of their specialization. The aim has been that students prepare their dissertation in any of the cooperating universities while they work and on a topic of interest to their employer. The multidisciplinary nature of the doctoral program and its close ties to the corporate world enable the creation of continuous and fruitful cross-disciplinary discourse between students with different professional backgrounds.

The long-term goal of the doctoral program has been to strengthen high-level international expertise in the forest cluster, securing global competitiveness and top strategic know-how in the field also in the future. The program aimed to respond to powerful structural changes in industry by training professionals with extensive multidisciplinary know-how. The programme started on November 2008, funded by participating universities, and originally 14 participant post-graduate students from different scientific disciplines and universities were accepted into it. The first dissertations will be during 2015.

The FCDP has supported students through e.g. an orientation period, several seminars and lectures and intensive writing periods. Participants not only gained the latest information but also a broad spectrum of tools and support for effective higher continuing education. The systematically structured doctoral program facilitated planning and the completion of studies. A virtual learning environment brought students together between meetings, regardless of where they were working at the moment.

According to the feedback questionnaire on winter 2015, people involved in the programme wish that corresponding activities for doctoral students outside university would be developed also in the future. Hopefully, the results gained in FCDP could also benefit other projects which aim to support doctoral studies alongside work.

Management Committee of FCDP

Alén Raimo, University of Jyväskylä, Chairman of the steering group

Gädda Lars (until 2012), Leskelä Markku (from 2012), Forestcluster Ltd.

Kässi Tuomo, Lappeenranta University of Technology

Leiviskä Kauko, University of Oulu

Poppius-Levlin Kristiina, VTT Technical Research Center of Finland

Willför Stefan, Åbo Akademi University

Vuorinen Tapani, Aalto University

Coordinator

Virkki-Hatakka Terhi, Lappeenranta University of Technology

During 2012 – 2014, the management committee had approximately 4 meetings/ year, most of them virtually on Adobe Connect Pro (ACP) environment.

Activities

In the beginning of the programme 2008, doctoral students' skills in scientific research were strengthened via through courses of research methodology, scientific writing etc. Since the students of the FCDP will be completing their studies while they work, they were offered intensive courses, as well as opportunities for distance education and web-based instruction. In 2012-2014, most of the students had already finished all doctoral courses they needed. Thus, the FCDP activities emphasized seminars and supporting scientific writing that has been generally recognized as a bottleneck in doctoral studies.

The virtual homeroom in Moodle environment was updated and available for FCDP students all the time. The environment includes news, discussions, links concerning doctoral studies and all materials from every FCDP event from the beginning.

The activities 2012 – 2015 are listed below. Annual check-point took place on spring: students filled in the form of annual study report (see Appendix 9) and sent it to their supervisors and FCDP coordinator. The reports served as a snapshot of the study situation for both students themselves and their supervisors as well as for the FCDP steering group. Reports included:

- Courses and ECTS credits completed
- Type of thesis; monograph or article based
 - o Scientific articles and their status (published/ in review process/ submitted/ under construction)
- Schedule with an updated project plan
 - o Estimate of a graduation year
 - o The next phases of the research work
- Possible members of personal steering group
- Other issues

Also both FCDP seminar and intensive writing period, 'Writing Tube' have been arranged annually. During every year there were several virtual researcher meetings via Adobe Connect Pro (ACP), hosted by Terhi Virkki-Hatakka, and management committee meetings. Other activities during the years are explained on the list as well.

2012

Virtual researcher meeting 1/2012 on January 13th

1. Introducing plans of action 2012
 - FCDP
 - Doctoral students personal plans
2. Introduction of a database for scientific articles (Julia Vauterin-Pyrhönen, LUT)
3. Planning discussion of an intensive writing period, "writing tube": what students expect, when, where etc.
4. Peer students as a resource in supervision (Terhi Virkki-Hatakka)
 - Based on a book *Vertaisuus voimavarana ohjauksessa* by Leena Penttinen et al., University of Jyväskylä, 2012
5. Other issues

Virtual researcher meeting 2/2012 on March 9th

1. My research: Optimization of business model for biofuels sourcing and processing /refining (Marica Kilponen)
 - => discussion
2. Check-point of doctoral studies on March 2012
3. Information about The Writing Tube at the end of April
 - Orientation: two virtual lectures by Pekka Belt about writing an article and a dissertation
4. Publishing about the research made in a company (Keijo Salmenoja, Andritz Oy)

1st Writing Tube orientation lecture: Writing a scientific journal article on April 13th

Pekka Belt (University of Oulu) via ACP at 13.00 - 16.00 o'clock

2nd Writing Tube orientation lecture: Writing a dissertation on April 23th

Pekka Belt (University of Oulu) via ACP at 9.00 – 12.00 o'clock

The writing Tube on April 26th - 27th 2012

Lappeenranta University of Technology

The students disentangled from their work for a couple of days, and concentrated only on writing their dissertation or articles. Each of them got an own researcher room at LUT, but besides writing alone, some collective info discussions were arranged with several introducers.

See the schedule on Appendix 6.

Virtual researcher meeting 3/2012 on June 20th

1. My research: Adsorption of dissolved and colloidal materials on paper fillers (Jukka Selin)
2. Feedback discussion about The Writing Tube – how did you continue writing after that?
3. Scholarships and grants available for doctoral students
4. The FCDP activities on autumn 2012
5. Discussion: other issues

Workshop at Peda-Forum August 21st

Minä poljen, sinä ohjaat –työpaja (hosts Terhi Virkki-Hatakka & Sini Sarvilahti)

In Finnish, 31 participants from different universities

Introducing lectures

- KE-TU 2011 – keskeytynyt opiskelu tutkinnoksi (Sini Sarvilahti)
- Miten parhaiten voisi tukea työssäkäyviä tohtoriopiskelijoita? (Terhi Virkki-Hatakka)

Virtual researcher meeting 4/2012 on September 24th

1. Introduction of new virtual environment Moodle (Project coordinator Marjaana Kareinen)
2. How to convince your employer that your doctoral study is a good thing?
 - Compliments from Peda-Forum (Terhi Virkki-Hatakka)
3. Check-list for doctoral students used in LUT Industrial management
4. Coming: FCDP'12 annual seminar and article afternoon
5. Discussion: other issues

FCDP'12 seminar October 8th 9:45 - 12:45

Place: Aalto University, room Kuitu / PUU 1, Tekniikantie 1, Espoo

Chair: Terhi Virkki-Hatakka

1. FCDP students presenting their research to peers
2. Discussion and peer support

See the programme on Appendix 6, page 1.

The Article Afternoon, Open seminar 13:30 -16:00

Place: Aalto university, Lecture room 1 / PUU1

Chair: prof. Tapani Vuorinen

See the programme on Appendix 6, page 2.

Virtual researcher meeting 5/2012 on November 12th

1. Hands-on: Checking your Moodle user name and password (Marjaana Kareinen)
2. Resistance for change and how to deal with it (Markku Ikävalko)
3. Discussion
 - Convincing your employer about your doctoral studies
 - How doctoral student can be active in his/her contacts to university
4. Update: what is situation now with the texts you wrote in Writing Tube?
5. Discussion: other issues

Tekniikan yliopisto-opetuksen kehittämispäivät 14.-15.11. 2012

Vanajanlinna, Harviala, Hämeenlinna

Workshop: Tohtorikoulutuksen kehittäminen: osaamisprofiilit, rakenne, vaikuttavuus
(In Finnish)

3. Introduction: Case FCDP (Terhi Virkki-Hatakka)

2013*Virtual researcher meeting 1/2013 on February 22nd*

1. Assessment of a doctoral thesis; what reviewers and opponents take notice?
2. Introduction of FCDP students' plans and targets for the year 2013
3. Information about the coming check-point for studies and schedule
4. Introduction for the planned FCDP actions 2013
5. Discussion: what kind of support would promote your research best?

Virtual researcher meeting 2/2013 on February 22nd

1. Scientific writing - Basic questions and issues (english lecturer Peter Jones)
2. A true story of publishing an article – case *Development of Chemical Engineering Course Methods Using Action Research* (Terhi Virkki-Hatakka)
3. Information about Publication forum, 'Julkaisufoorum'
4. 'Kirjoitusputki' preparation task (see Appendix 5)
5. Discussion: other issues

The Writing Tube 2.-3. May 2013

Lappeenranta University of Technology

See the programme on Appendix 3.

The workshops for developing doctoral education

Arranged by TEK in Espoo June 4th, and in Lappeenranta June 6th

- Coordinator Terhi Virkki-Hatakka participated

Virtual researcher meeting 3/2013 on June 17th

1. Where your doctoral research lies at the moment?
 - Reflection by using the fourfold table (SWOT analysis)
 - Discussion and conclusions
2. Situation of each other's articles after the Writing Tube
3. Reviewing process of an article candidate
 - examples about review forms sent to reviewers from a journal
 - how to answer to reviewers' comments
4. Grants available for doctoral students
5. Coming events: FCDP'13 annual seminar and FIBIC seminar
 - Posters to FIBIC seminar
6. Discussion: other issues

Virtual researcher meeting 4/2013 on September 24th

1. Overview to doctoral students' research topics
 - discussion
2. Introduction to the scientific communication (communication lecturer Aija Käkelä-Laine)
3. Seminar days this evening, and how the research can be presented there
4. Invention? Ways to stick out for your right to the idea.
5. Discussion: other issues

Virtual researcher meeting 5/2013 on October 29th

1. Overview to doctoral students' research topics
2. Introduction to forthcoming FIBIC seminar (Markku Leskelä)
3. Coming FCDP'13 seminar
 - Also supervisors will be invited
4. Survey of student viewpoints for the doctoral programmes' audit 2014:
 - o What are "the doctoral skills"?
 - o How the skills can be evaluated?
 - o Implementation of doctoral education
 - scientific research and publishing, teaching, pedagogical methods, supervision, evaluation, well-being of doctoral students
 - o What are the most important evaluation methods and follow-up indicators?
 - o How the doctoral programme has developed during the last years?
 - o What actions are going on at the moment to enhance the quality of the doctoral programme?

FIBIC-seminar on November 21st 2013 / Helsinki

Finnish Bioeconomy Cluster (FIBIC) seminar gathered doctoral students of forest-based research groups together. FCDP students were invited to participate the seminar, also. FCDP students presented posters about their research topics, and at the same time, they had an excellent possibility to network with other researchers.

FCDP'13 seminar November 21st 2013 / Espoo

Place: Aalto University, Small lecture hall, PUU 1, Vuorimiehentie 1, Espoo

Chair: Terhi Virkki-Hatakka

4. FCDP students presenting their research to peers
5. This year, also supervisors were invited in the doctoral students' annual FCDP seminar.
6. discussion

See the programme on Appendix 7.

Virtual researcher meeting December 19th 2013

1. The goals of year 2014 for each student
2. FCDP action plan 2014
3. What would be the best ways for FCDP to support students to reach their personal goals?

2014

Virtual researcher meeting March 3rd 2014

1. Overview to doctoral students' research topics
2. Check-point of doctoral studies
3. Coming FCDP activities
4. Instructions concerning doctoral studies and process
 - Publishing
 - Dissertation process

Virtual researcher meeting August 13th 2014

1. Overview to doctoral students' research topics
2. Peer support and discussion
3. Research funding
4. Scientific writing

The Writing Tube 28.-29. August 2014
Lappeenranta University of Technology

See the programme on Appendix 4.

Virtual researcher meeting October 3rd 2014

1. Where your doctoral research lies at the moment?
2. The public defense of a doctoral thesis
 - Lectio praecursoria
 - Karonkka
3. Supervision
 - What supervisors expect from students?
 - How a student can manage his/her supervisors?

Virtual researcher meeting November 11th 2014

1. Overview to doctoral students' research topics
2. About research ethics
3. Forthcoming FCDP'14 seminar day
4. LUT multidisciplinary conference for all doctoral students

2015

In 2015, FCDP was not funded anymore. However, some actions were still arranged particularly to the FCDP group. In addition, the whole group was invited to LUT Doctoral School (LUT DS) events, e.g., 'Career workshop' and seminar 'Getting your paper published – A gamble or a skill?'

FCDP'14 seminar January 9th 2015 / Lappeenranta

Place: LUT,

Chair: Terhi Virkki-Hatakka

7. 'Dissertation simulation'
8. FCDP students presenting their research like *lectio praecursoria*
9. Questions and discussion

See the programme on Appendix 8.

Check-point of studies until March 31st 2015

As every year before, doctoral students updated their studies in Annual study report forms (see appendix 9).

Virtual researcher meeting November 14th 2015

1. New part-time students from LUT DS brought together with FCDP students
 - Introductions, discussion
2. Order or chaos? Library services for doctoral students including e-books and their licencing (Marja Talikka, Hanna Värri)

The dissertation of Jukka Selin, June 12th 2015

The first dissertation of the FCDP student was delivered from University of Jyväskylä to other FCDP students virtually.

Doctoral students

Most of the FCDP students study alongside their work. Close contacts with industries are a given since both the research topics and students are affiliated with them. Therefore, industry has the possibility to immediately exploit the research results yielded by the doctoral program. Generally speaking, the position of the FCDP is of societal importance due to the involvement of the cooperating universities, VTT and Forestcluster Ltd., which has taken an active approach to implementing the future research themes of the forest cluster. Besides the shareholders of Forestcluster Ltd., students from other companies whose line of business touches forest sector can be accepted in FCDP.

The Management Committee decides on admissions to the doctoral program on the basis of student candidates applications. The admission criteria include:

1. A letter of acceptance as a doctoral student - including a study schedule plan
2. Certificates and diplomas of former degrees
3. A motivation letter
4. A statement from the employer indicating their support for the student's studies, or other financing plan.

Until now, altogether 14 students have been accepted in Forest Cluster Doctoral Program. At the moment, one student has opted out of FCDP for health reasons and two students are passive due to their present working situation. The abstracts of 11 active FCGS members are presented next in this project report. In addition to FCDP members, some other students have been participating actively in FCDP courses and seminars.

Some students are writing journal articles for a basis of their dissertation, and some of them are writing their thesis as a monograph.

Järnefelt, Christian

Topic: Catalytic Bleaching of Hardwood Pulp

Main subject: Forest Products Chemistry

Supervisor: Tapani Vuorinen

Aalto University, School of Chemical Technology

Department of Forest Products Technology

Employer: Andritz Oy

Contact (e-mail): christian.jarnefelt@andritz.com

Doctoral studies to be completed in 2017 or 2018

ABSTRACT**Catalytic Bleaching of Hardwood Pulp**

Keywords: pulp bleaching, catalyst, Hexenuronic acid (HexA), lignin, hypochlorous acid, 1,4-diazabicyclo[2.2.2]octane (DABCO), medium consistency (MC), eucalyptus

The purpose of the research is to find new ways to make pulp bleaching a faster, shorter, more economical and environmentally friendly process. The goal is to make the present-day process, which consists of bleaching in various stages with different chemicals for several hours, a more effective one with the least amount of phases and chemicals as possible.

The main focus of the research is on the study of the removal of Hexenuronic acid (HexA) and lignin with the help of catalysts. Laboratory work has been done with plastic bags and laboratory MC reactor, and results analyzed with UV-Raman spectroscopy. The findings up to now show that the removal of HexA can be done in milliseconds at room temperature, making it an attractive and interesting option to the present-day 2-3 h acid hydrolysis stage at high 90C temperature. The new catalytic stage using the tertiary amine DABCO was also tested at pilot plant scale with an industrial MC mixer. Results were convincing and mill-wide trial runs are under consideration.

Further optimization of the reactions of DABCO and other catalysts could allow the discovery of other drastic improvements in the bleaching process. Success could change the way we think of pulp bleaching in the future.

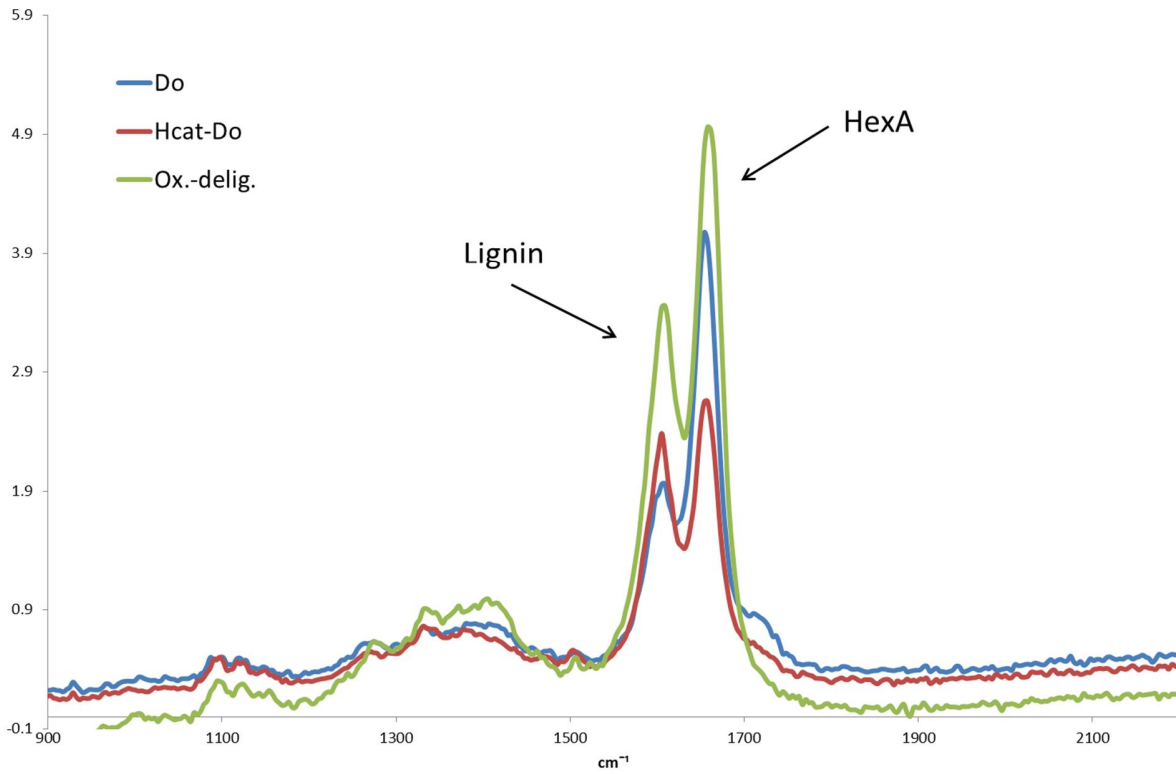


Figure 1: UV-Raman spectra comparing Do and Hcat-Do

PUBLICATIONS

N. K. Chenna, C. Järnefelt, J. Sucipto, P. Piovano, T. Vuorinen. Catalytic pulp bleaching. 7th International Colloquium on Eucalyptus Pulp, May 26-29, 2015. Vitoria, ES, Brazil

Kautto, Jesse

Topic: Techno-economic feasibility of a biorefinery pulp mill

Main subject: Technology Management

Supervisor: Tuomo Kässi

Lappeenranta University of Technology, School of Business and Management

Contact (e-mail): jesse.kautto@lut.fi

Doctoral studies to be completed: 2015

ABSTRACT

Techno-economic Feasibility of a Biorefinery Pulp Mill

Keywords: Biorefinery, techno-economic feasibility, biofuels

Second generation biofuels, using non-food feedstocks as raw material, are of current interest. The objective of this thesis is to evaluate the conceptual feasibility of two biomass fractionation methods for the production of second generation, lignocellulosic ethanol and other products: pre-extraction of hemicelluloses prior to kraft pulping and organosolv pulping. The hemicellulose extraction is carried out through a so called prehydrolysis process. In the process, hemicelluloses present in wood are hydrolyzed and solubilized, enabling their separation. This further enables the co-production of paper-grade pulp and ethanol or other hemicellulose-based chemicals, fuels or biomaterials. The feasibility of the concept will be evaluated mainly from a technical perspective, evaluating the effects of the hemicellulose extraction on the operation of the pulp mill. The studied organosolv concept aims at fractionating lignocellulosic biomass to three main streams: cellulose, hemicellulosic sugar and lignin containing streams. Both the cellulose and hemicellulose sugars are assumed to be fermented to ethanol. The effect of the recovery of other co-products, namely lignin, furfural and acetic acid, is however taken into account in the analysis. Both technical and economic aspects are covered in the feasibility analysis.

PUBLICATIONS

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Keränen, Juha

Topic: Environmental fate and analysis of hazardous environmental chemicals –
Nonylphenoethoxylates and polyfluorinated surfactants

Main subject: Applied chemistry

Supervisors: Juha Knuutinen (JyU), Jaana Koistinen (University of Helsinki)

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Doctoral studies to be completed 2018

ABSTRACT**Environmental fate and analysis of hazardous environmental chemicals –
Nonylphenoethoxylates and polyfluorinated surfactants**

Keywords: Polyfluorinated compounds, perfluorinated compounds, nonylphenoethoxylates,
biodegradation, accumulation, environmental fate

For decades the environment has been contaminated with a number of anthropogenic chemicals. Some of these harmful compounds have proven to be ubiquitous, stable and bioaccumulative as well as toxic to living organisms. A significant amount of chemicals will finally be deposited in the aquatic environment where they can persist for a long time, even if this production and use would stop. Also some stable toxicants can be formed in the environment via anthropogenic precursor compounds. The rate of formation will be influenced by environmental conditions such as oxygen content, salinity and temperature as well as, for example, turbidity. It is important to know the effect of these parameters in order to evaluate the risk chemicals might pose in constantly changing environment. For instance global climate change and its effects in the oceans (increase in temperature, decline in salinity) can have a significant impact on the solubility and availability of chemicals deposited in the sediments.

The chemicals evaluated in this study belong to the two groups of surface active agents: Nonylphenoethoxylates (NPEs) and per- and polyfluorinated compounds (perfluoro-octanesulfonate (PFOS)/perfluoro-octanoic acid (PFOA) as well as their precursors).

NPEs are a group of detergents once used globally but nowadays their use is restricted in the EU because of their endocrine disrupting properties. NPEs also degrade into nonylphenol a potent endocrine disrupting chemical. Despite of the restricted use, NPEs are still being deposited to aquatic environments throughout EU as significant concentrations can be found for example in imported textiles and fabrics.

PFOS and PFOA are perfluorinated compounds, used for impregnating fabrics to make them water and stain repellent. These compounds are ubiquitous in the environment and high concentrations have been detected in remote arctic regions, which would suggest that long range atmospheric transport of the volatile precursors of these chemicals will deposit in the oceans after degradation.

The overall purpose of this study is to evaluate the environmental fate of these two groups of chemicals in changing environmental conditions and to produce analysis- and monitoring methods for the aquatic environment. The study will produce information about the bioaccumulation and – degradation of NPEs, PFOS and PFOA in aquatic environment as well as in wastewater treatment plants (WWTPs) and evaluate the role of environmental parameters in these processes. Another objective of this study is to develop applicable passive sampler based- monitoring method which could be suited for regulatory purposes. This information will serve the objectives of REACH and water framework directive.

The accumulation of these surfactants will be studied with crustaceans (*Daphnia*), and with suitable passive samplers in aquariums in climate controlled rooms. Passive samplers will also be evaluated in environmental conditions in the Baltic Sea together with mussels.

Degradation studies will be done in climate controlled rooms in different temperature, dissolved oxygen and salinity conditions. Reference method will be the OECD biodegradation method with inoculum collected from a WWTP. Analytical work will consist of LC-MS and LC-MS/MS methods.

PUBLICATIONS

Pessala, P., Keränen, J., Schultz, E., Nakari, T., Karhu, M., Ahkola, H., Knuutinen, J., Herve, S., Paasivirta, J., Ahtiainen, J., Evaluation of biodegradation of nonylphenol atoxylate and lignin by combining toxicity assessment and chemical characterization, *Chemosphere* 75 (2009) pp. 1506-1511

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Kilponen, Marica

Topic: Optimization of business model for biofuels sourcing and processing / refining

Main subject: Bioenergy Technology

Supervisor: Tapio Ranta

Lappeenranta University of Technology, School of Engineering Science

Employer: Promeco Group Oy

Contact (e-mail): maricakilponen@gmail.com

Doctoral studies to be completed 2018

ABSTRACT**Optimization of business model for biofuels sourcing and processing/ refining**

Keywords: bioenergy

Motivation/problem statement:

Future adequacy and availability of fossil fuels and climate change related concerns have been waking up interest of authorities in many countries. Leaders of countries have begun develop plans, laws and different level programs to switch fuels used for energy production from fossil fuels to renewable sources. Renewable energy targets have been set in challenging level from techno-economic point of view, especially when considered given one decade timeframe. Lot of development work, research and practical demonstrations have already been established in Finland and Sweden over the last few decades, when elsewhere bioenergy related processes aren't always well-known. Utilization of bioenergy has been taking off in leaps also in Iberian Peninsula during the last few years. Entire market of biomass for fuels and also technology used to harvest it is still very fragmented, which is making planning of new power plant challenging. First calculation models have been published for few different harvesting methods, but they are focusing on operations in limited conditions and machinery, or biomass resources. Bioenergy market has seldom been analyzed from power plant point of view considering all the possible sources and methods.

Methods/procedure/approach:

Data collection for this study is divided in several sub-studies, where existing knowledge of biomass supply chains profitabilities will be expanded with new harvesting methods in new conditions and applications. In practice the information will be gathered through interviews and from different types of harvesting machine automation systems. In addition future research methods like Delphi will be used to forecast harvesting technology development directions. Articles will be written for example about slash bundling method.

Results/findings/product:

Based on existing experience the ultimate goal of this study would be to develop a model, which helps energy producer to optimize biofuels sourcing and processing including different fuel resources and harvesting methods of them. Ideally evaluation could be taken down to the machinery fleet size level, where productivity of different harvesting methods could be one of the decision factors.

Results of first case studies

The aim of first case study was to clarify the maximum productivity of logging residue bundling units and the cost of logging residue bundling systems at the roadside landing. In order to find the bundling unit's productivity, a set of timed studies were carried out in which several working techniques were tested and evaluated. The cost-efficiency of the roadside bundling system was compared with the conventional bundling system, wherein the logging of residue logs is made directly in the terrain and, after bundling, the logging residue logs are forwarded to the roadside landing with a forwarder. The harvesting cost (€/m³) of the extracted wood biomass to the roadside landing was calculated for both bundling systems using time study data obtained from this study and productivity models and cost parameters acquired from the literature.

The productivity of roadside bundling ranged from 48 to 53 logging residue logs per effective working hour (E0h), depending on the working technique used, (Period, New Sentence starting with The) and the mean time required to produce one logging residue log ranged from 83.6 to 92.3 seconds (E0h). The harvesting costs of the logging residue logs (€/m³) at the roadside landing were 11.5-13.7 €/m³ for the system based on bundling in terrain and 10.8-17.7 €/m³ for the system based on bundling at the roadside landing when the forwarding distance was in the range 100-600 m and the removal of logging residues was in the range 30-90 m³/ha. According to our results, bundling at the roadside landing allowed a reduction in harvesting costs, when the forwarding distance of the logging residues was 100 m or less and removal was beyond 50 m³/ha. The cost savings were quite small, however, at 0.1–0.7 €/m³.

In second case study is focusing in the main differences in the slash bundling market areas, and why are they developing differently. In an aim to get a better understanding of bundling related business and market differences, all current and former slash bundler customers in Finland and

Spain have been interviewed. Results of the study show interesting differences in business models, which directly relate to the overall profitability. Based on these results, it's also obvious that the earlier learning period of using bundles still has a great impact on this method's reputation: the moisture of bundles and cutting of twine are still seen as a challenge, even though there are good examples of power plants who have learned how to use bundles in more efficient ways. Using bundles as part of a logistical solution in the biomass supply chain can offer several benefits to the forest energy sector. The main differences in business environment are in the amount of operating months in year, the bundled wood species, the amount of bundles per operation area and the duration of agreement with the bundle's user. Similarities are found in operating radius, dedicated operators and the amount of the bundling units.

Third case study and second phase of slash bundling business study focuses on profitability factors in Finland and Spain. One entrepreneur in both markets was interviewed and they provided us with their economic data. This economic data was fed into the TimberCalc cost calculation software.

The results of the study have been grouped in twelve different cost factors, which are:

<i>Direct costs</i>	<i>Indirect costs</i>
Deductions	Fuel
Interest	Hydraulic oil
Wages	Repair and service
Overhead costs	Saw bars
	Saw chains
	Saw chain oils
	Twine
	Mileage allowance

The comparison has been made in a rate of one produced unit.

In Finland direct costs are presenting 53% when in Spain they are 65% of all costs.

Conclusion/implications:

This research provides new knowledge in the context of implementing variable and flexible business models to supply biofuels for processing.

Lappalainen, Heikki

Topic: Recovery boiler fouling prediction from recovery island process measurements and controls

Main subject: Embedded Intelligence Systems

Supervisors: Jero Ahola, Esa Vakkilainen

Lappeenranta University of Technology, School of Engineering Science

Embedded intelligence systems

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Doctoral studies to be completed 2016

ABSTRACT

Recovery Boiler Fouling Prediction from Recovery Island Process Measurements and Controls

Keywords: measurement, control, modeling, prediction

In this dissertation the focus is in the prediction of the recovery boiler fuel property changes at the pulp mill. The theme is studied by going deep into chlorine and potassium process data mill wide. The data is generated in distributed control systems (DCS). The related pulp mill data will be collected from the recovery island; recovery boiler, evaporation, caustization, lime-kiln and cooking on sufficient time interval and mill load. The statistics, time-series analyze methods and process knowledge will be combined to find reliable signals or rules for soft sensors that can predict recovery boiler fouling amount and timing earlier and more precise than with the present technique.

WASHING,,DRYING MACHINE, RECOVERY BOILER, COOKING, WOOD YARD, EVAPORATION, LIME KILN

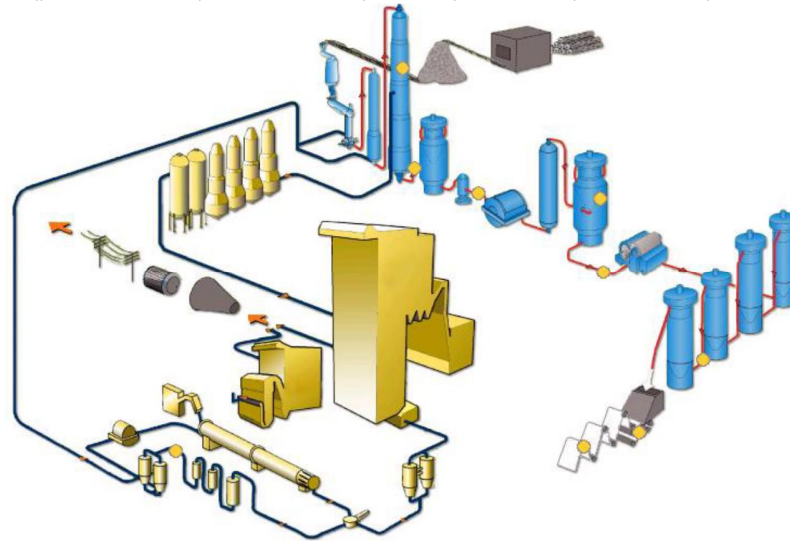


Figure HL-1. Recovery Island (yellow), Fiber Line (blue) [Know Pulp 12.9.2011]

Recovery boiler is the most expensive component at the pulp mill. It produces high pressure steam and does chemical recovery from high dry solid content black liquor (firing liquor). The black liquor is evaporated from cooking residuals. The firing liquor is sprayed to the boiler furnace where the chemical recovery takes place and the heat is released (combustion) up to heat transfer surfaces. The boiler heat transfer from flue gas to water and steam realizes through pipe construction; bottom, walls, superheaters, boiler bank and economizers. The flue gas carries ash particles that stick to heat transfer surface on suitable temperature causing fouling. The heat transfer surface fouling is retarded by sootblowing technique, where medium pressure steam is blown to the superheater, boiler bank and economizer surfaces via rotating lance (sootblower). The control of the sootblowing is based on automatic deduction about the areas and speed of fouling. These heat transfer surfaces could reach the fouling level when they must be water washed. This expensive action does not always become evident after certain time of mill running, but as a result of firing liquor properties, mill load, boiler features and operation. Process events that have critical consequences in safety, availability, production or maintenance are the most interesting at the pulp mill and process technology generally. When one department goes down it may cause mill wide shut- down. Early predictions of these incoming problems, to avoid them, are worth of health and money.

In this dissertation the focus is in the prediction of the recovery boiler fuel property changes at the pulp mill. Modern pulp mills are monitored and controlled by the DCS that collect time-stamped process sample values (data) in every process department. There are basic measurements and controls like temperature, pressure and flow to mention and more special ones like pH, conductivity, emissions among others. Some of the values have remarkable correlations with the recovery boiler fuel, firing liquor and thus are the keys for the fuel quality monitoring.

Paavilainen, Juha

Topic: Cleaning of ceramic filter plates

Main subject: Unit operations of Chemical Engineering

Supervisor: Antti Häkkinen

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Employer: LUT

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Doctoral studies to be completed 2016

ABSTRACT

Cleaning of ceramic filter plates

Keywords: Ceramic filter, acid cleaning, filter regeneration, permeability

Ceramic capillary action filter plates are mainly used in the mining industry to filtrate mineral slurries. Sporadically filter media is clogging by fine solid compounds and then filtration capacity will decrease. Permeability of the filter plates will be restored by different types of acid cleaning methods. Same washing method is not suitable for all applications, therefore case-specific washing experiments is needed. With tailored washing method filtration capacity will be higher; longer production cycles are possible and less time is needed for filter washing.

This study focuses on different cleaning methods of ceramic filter plates to find out environmentally and economically optimum cleaning procedure.

Pöyhönen, Olavi

Topic: Paper formation as a function of critical operation parameters of the paper machine

Main subject: Paper Technology

Supervisor: Kaj Backfolk

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ABSTRACT

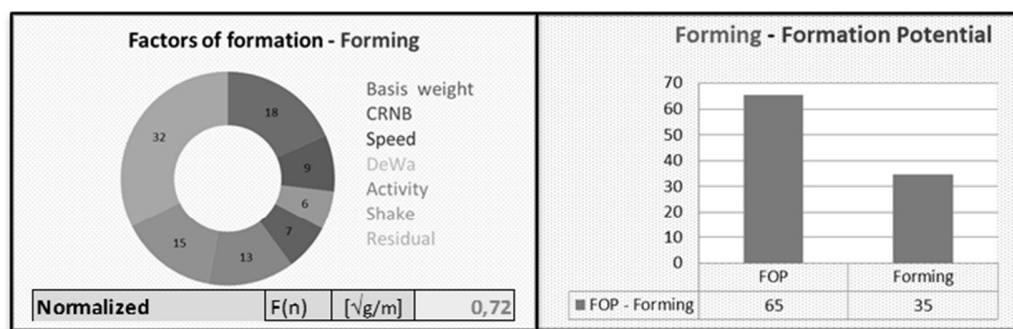
Paper Formation as a Function of Critical Parameters of the Paper Machine

Keywords: Paper formation, crowding factor, consistency, activity, dewatering

Paper formation is defined as small - scale variation of basis weight in plane of paper sheet. It describes how evenly all the used material; fibers, fines, filler and chemical additives are deviated in to the paper structure.

Formation is one of the most important structural properties of paper. Almost all physical paper properties are in connection to the formation: strength properties, optical properties and printability properties of paper. Formation of paper plays an important role in runability of paper and converting machines. Formation correlates with quality properties of paper as well as with good efficiency coefficient of the manufacturing line and paper quality.

The focus of this research is to find relationship between operational parameters of forming unit and paper formation. This is done by collecting process data and samples and from commercial paper machines adjusted with different kind of forming units. Influence of retention aids and other chemicals aids are excluded out of the research. Choice of paper machines of this research is made so that as an assumption the influence of process chemicals has the same influence to paper properties. Furnish properties are compared with handmade laboratory samples.



Web Forming

Formation Potential

Rantamäki, Jukka

Topic: Utilization of statistical methods and modeling in forest industry

Main subject: Technology Management

Supervisor: Tuomo Kässi

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School of Business and Management

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Doctoral studies to be completed 2015

ABSTRACT

Utilization of Statistical Methods for Management in Forest Industry

Keywords: Statistical process control, SPC, Organizational learning, Design of experiments, Simulation, Data mining

Phenomena are researched empirically. Based on the knowledge gathered of phenomena it is possible to model entire production processes or parts of them. A large portion of expensive and laborious pilot and mill trial may be avoided by utilizing modeling.

All work is a series of interconnected processes that are in interaction. All processes have variation. Understanding and controlling this variation accelerates and facilitates development of processes. All experiments are done because process developer does not have adequate knowledge of the process. Statistical design of experiments may minimize the needed input of resources to produce desired knowledge. Statistical methods also provide a chance to learn. Deviation presents a situation where the events of reality are outside the models limits or the model is not accurate enough. By finding out the cause of deviation it is possible to learn and include the accumulated knowledge in the model. Models can serve as organizational memory that is independent of individuals.

Although the customers' need for uniform product and process variability reduction are almost a mantra in chemical forest product sector, research on how the methods to decrease variation (e.g. statistical methods) are applied and what is the measurable economic benefit of applying them is insufficient. A modern chemical pulp mill is highly automated, but despite the various online sensors and advanced process control systems the humans do the decisions in the end. Motive for this research is thus generated from the fact that research concerning the applying of statistical methods in chemical forest product sector and the benefit generated by it is insufficient. This dissertation takes a holistic approach on the subject as it discussed from managerial, economic and technical angles. The research problem addressed by this dissertation is:

Companies in the chemical forest product sector require new knowledge for improving their utilization of statistical methods

This problem is studied from five complementary viewpoints – challenges and success factors, organizational learning, problem solving, economic benefit and statistical methods as management tools - and the research questions are generated based on these viewpoints.

Research questions:

- What are the challenges and success factors when utilizing statistical methods in chemical forest industry operations?
- How can statistical methods act as means of organizational learning in chemical forest industry operations?
- How can statistical methods contribute to problem solving in chemical forest industry operations?
- What is the economic benefit when utilizing statistical methods in chemical forest industry operations?
- How can statistical methods be utilized as management tools in chemical forest industry operations?

Research in this dissertation is done using case studies. Statistical methods and modeling are implemented in pulp production and resulting findings are compared to existing literature. Literature may be available only from other industries. The following articles constitute the foundation of the dissertation:

- I. Rantamäki, J., Isokangas, A., Ala-Kaila, K., and Honkanen, T. (2014). Estimation methods of log loading performance in industrial debarking for the kraft pulping process. *Nordic Pulp and Paper Research Journal*. 29(4), pp. 592-598.
- II. Rantamäki, J., Tiainen, E. and Kässi, T. (2013). A case of implementing SPC in a pulp mill. *International Journal of Lean Six Sigma*, 4(3), pp. 321-337.
- III. Saarela, O., Rantamäki, J., Penttinen, I. and Nappa, M. (2009). Lime Kiln diagnostics with case base reasoning. Conference article. In: *Proceedings of the 2009 International Conference on Information & Knowledge Engineering IKE 2009*. Las Vegas, NV, USA, 13 - 16 July 2009. CSREA Press. USA, pp. 351-356.
- IV. Rantamäki J. and Saarela, O. (n.d.). Diagnosis and economic impact of operational variability – a case from the chemical forest industry. *Journal of Quality in Maintenance Engineering*. Accepted for publication Jan. 2015.

Paper I discusses a situation, where process measurements are not adequate for controlling and estimating day to day performance in a pulp mill wood handling. A set of estimation methods, some of them commonly used in other industries, are proposed for controlling and estimating purpose.

Paper II studies a case where statistical process control (SPC) is implemented in a pulp mill organization. It shows that success factors for SPC implementation are in line with other industries although there are specific challenges concerning pulp and paper industry. The second paper also proves that SPC can act as a means of organizational learning in pulp and paper industry. Paper III describes a system where lime kiln disturbances are analyzed mathematically and based on that analysis and former knowledge diagnosis of the causes are suggested to facilitate problem solving.

Paper IV studies a demanding variability problem solving case in pulp digesting. CRISP-DM (Cross-Industry Standard Process for Data Mining) framework applicability for continuous process problem solving is shown and economic impact of variability is estimated.

Riihimäki, Kalle

Topic: Reliability and Optimization of Design of Industrial Device Models

Main subject: Applied mathematics

Supervisor: Heikki Haario

Lappeenranta University of Technology , School of Engineering Science

Employer: Balance Engineering

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On sick leave at the moment

ABSTRACT

Reliability and Optimization of Design of Industrial Device Models

Keywords: heat exchanger, stochastic optimization, statistical analysis

BACKGROUND

Design and development of the process equipment is normally based on modeling phase, experimental tests and possible full-scale field tests. These steps can be iterative and repeated if needed and possible. Quite a common problem at each step is to find out which parameters are remarkable and important for the final product and which are less important.

Developed models are typically unit processes, which are optimized according to the given design parameters. However, in many cases these unit processes are in a final product coupled together and then the optimization focus has to be set instead of unit process to the total process optimization of the system. An example for this is a paper machine heat recovery system, which includes several heat recovery stages with different process parameters and operational times.

Another problem area in the process design is how to check the goodness of the solution after the equipment set is designed, manufactured and started-up. The main problem is that the operational point of the machinery is not the same as the original dimensioning point. In this case the validity of the solution is based on the measurements and analysis to proof the machinery's proper operation.

Quite often these measurements are difficult to carry out due to the operational conditions. Even the system layout can prevent the tolerable measuring operation. In this case the good knowledge about the real affecting factors and real check-up data is obvious.

The developed method can be utilized in many challenging heat integration studies and projects where the complete heat exchanger network (HEN) is optimized.

OBJECTIVE

The main objective for the project is to create a method for general optimization model and reliability analysis for the process equipment design and real life check-up. The main focus is to utilize the new statistical modeling and analyzing methods to increase the efficiency and reliability of the design and evaluation

processes. As a final result the new type of analyzing tool for prototyping and full-scale checking is to be developed.

METHODS

Research is divided into the following steps

- 1) Development of the unit process models and method test with manually generated data.
- 2) Real-life data collection with the pilot equipment and evaluation of the method feasibility.
- 3) Revised method based on the evaluation.
- 4) Real-life data collection from the production line and evaluation of the method feasibility.
- 5) Final revision and method documentation.

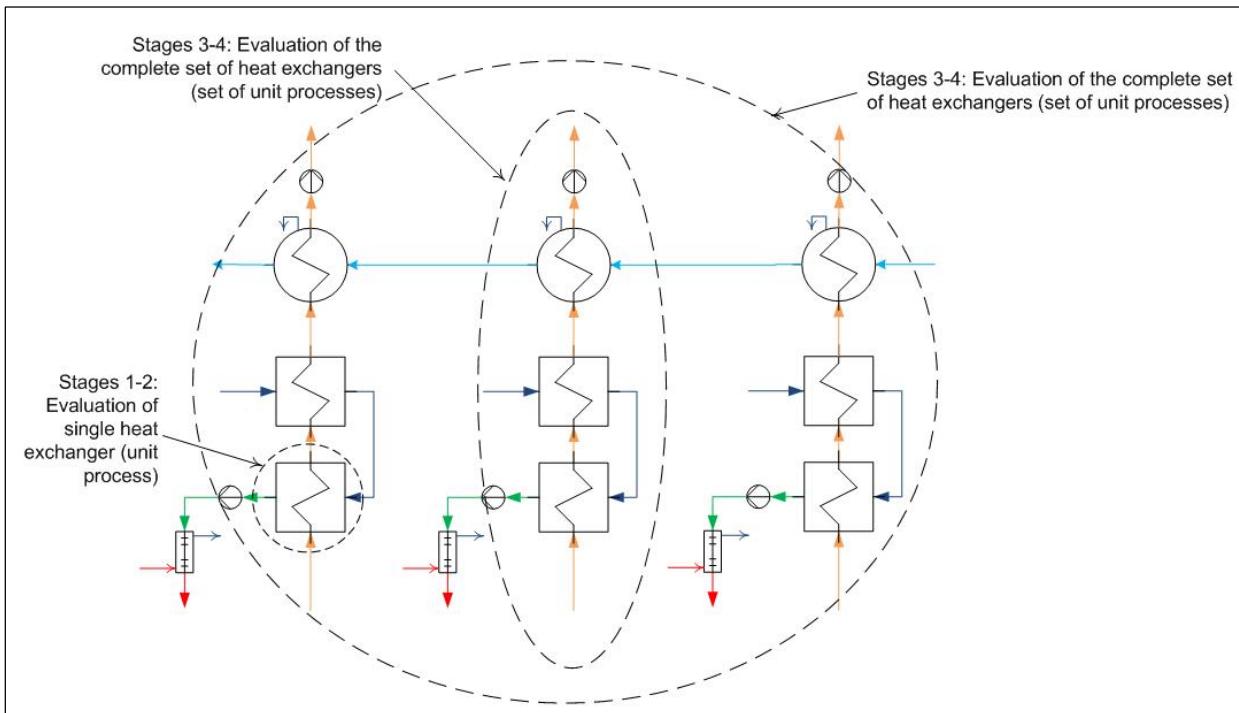


Figure KR-1. Project stages related to the example process including serial and parallel coupled heat exchangers.

PUBLICATIONS

Riihimäki, K. (2007). Optimal design of heat exchanger. In Tynjälä, T. and Sarkomaa, P., editors, LUT, Summer School of Heat and Mass Transfer, 2007.

Riihimäki, K. (2008). Characteristics and optimal operation of the paper machine heat recovery recuperator. In PaperCon 2008.

Riihimäki, K. (2009). Life cycle cost based optimization of pm heat recovery system for machine room ventilation. In PaperCon 2009.

Riihimäki, K. (2011). Heat Exchanger Analysis and MCMC-methods, European Summer School in Industrial Mathematics (ESSIM), Milan, 2011

Riihimäki, K. (2012). Mathematics Days 2012, Model for Condenser Process in Presence of Non-Condensable Gases, LUT, 2012

Selin, Jukka

Topic: Adsorption of Softwood-derived Organic Material onto Various Fillers During Papermaking

Main subject: Applied Chemistry

Supervisor: Raimo Alén

University of Jyväskylä

Faculty of Mathematics and Science

Department of Chemistry, Laboratory of Applied Chemistry

Employer: Mikkeli University of Applied Sciences

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Doctoral dissertation on 12th June 2015

ABSTRACT

Adsorption of Softwood-derived Organic Material onto Various Fillers During Papermaking

Keywords: adsorption, filler, DCS, extractives, carbohydrates, lignin

Natural or synthetically manufactured fillers are added to many printing paper grades at levels up to 20 - 35 %, to yield better surface properties of paper, e.g., enhanced optical properties, such as brightness and opacity. In order to achieve quality targets of paper, the surface properties of fillers are kept close to the original.

The purpose of this thesis was to understand more about the effect of dis-solved and colloidal substances (DCS) adsorption phenomena on fillers. The DCS material used in this work originated from dithionite- or peroxide-bleached thermomechanical pulp. In addition, the pH of the process water varied from acidic to neutral. Furthermore, electrolytes and pitch dispersing agents were dosed to alter the stability of pitch particles. All of the tests were performed in a laboratory, and finally, these phenomena could be compared to those from a paper machine.

The results indicated that all fillers adsorbed notably more extractives from the peroxide-bleached DCS water than from the dithionite-bleached DCS water at pH 7.5. Adsorbed extractives mainly consisted of pitch particles. The adsorption isotherm of carbohydrates achieved the same level regardless of bleaching. Galactoglucomannans were the main adsorbed component after the dithionite-bleached DCS water treatment and pectins after the peroxide-bleached treatment. Under acidic conditions, at pH 5.5, kaolin

adsorbed much more extractives as well as carbohydrates. In addition, fillers adsorbed the residues of lignin, which caused—together with extractives—a significant bright-ness reversion.

The results further suggested that in the case of kaolin and colloidal precipitated calcium carbonates, the electrolytes had an important role in the diminishing of pitch particles because the particles were aggregated easier. The opposite effect was seen when dispersing agents were used. Clearly, adsorption occurred more slowly, and the adsorption isotherm of carbohydrates maintained an s-shape in some cases when the dithionite-bleached DCS water was used.

Basically, the same results that were seen on the paper machine were also obtained in the laboratory tests. Fillers adsorbed dissolved galactoglucomannans and partly colloidal pitch particles, which covered by carbohydrates; hence, galactoglucomannans carried over together with the fillers onto paper.

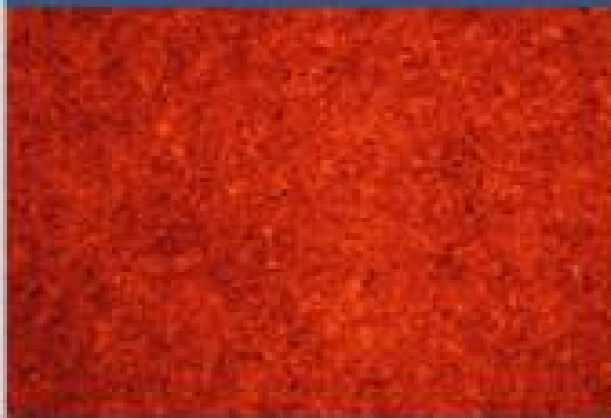
Appendices

1. FCDP posters in the FIBIC seminar, November 2013 (10 pages)
 - Olavi Pöyhönen: Paper formation – Forming unit
 - Heikki Lappalainen: Recovery boiler fouling prediction by way of pulp mill recovery measurements
 - Jukka Selin: Adsorption of dissolved and colloidal substances onto paper fillers in paper machine waters
 - Christian Järnefelt: Removal of hexenuronic acid
 - Marica Kilponen: Bundling logging residues at the roadside landing
 - Jukka Rantamäki: Utilization of statistical methods and modeling in forest industry (presented in seminar, but not attached here)
 - Terhi Virkki-Hatakka: FCDP – Forest Cluster Doctoral Program
2. The Writing tube 2012 (2 pages)
3. The Writing tube 2013 (2 pages)
4. The Writing tube 2014 (2 pages)
5. 'Kirjoitusputki' preparation (6 pages)
6. FCDP '12 Annual seminar & The Article Afternoon (2 pages)
7. FCDP'13 Annual seminar
8. FCDP'14 Annual seminar, arranged 9.1.2015
9. Form for annual study report (2 pages)

Posters in FIBIC seminar, November 2013

Olavi Pöyhönen

PAPER FORMATION - FORMING UNIT



Research of paper formation as a function of the forming unit.

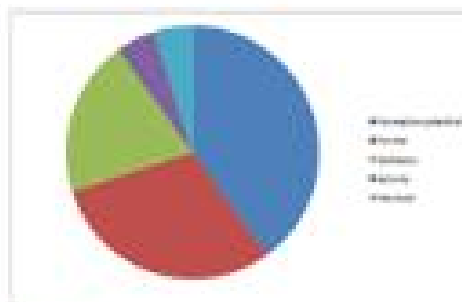
Forming units

- *fourdrinier*
- *hybrid former*
- *gab former*

Objective of the research:

Formation model - components of formation

Components of paper formation



Recovery boiler fouling prediction by way of pulp mill recovery measurements

Forest Cluster Doctoral Program

Heikki Lappalainen

hal2015@gmail.com

Chlorine (Cl) and potassium (K) are main actors in fouling and corrosion of pulp mill recovery island.

The K and Cl contents are measured from the liquor and ash samples in laboratory daily.

More updated value would be useful in fouling prediction.

This research find if the process values could be combined as virtual measurement, "soft-sensor".

Reasonable measurements and laboratory values should be found by data analysis, modeling and evaluation.

As result there would be mill wide automation system based soft-sensors used "on-line" without extra field automation equipment.



Lab values

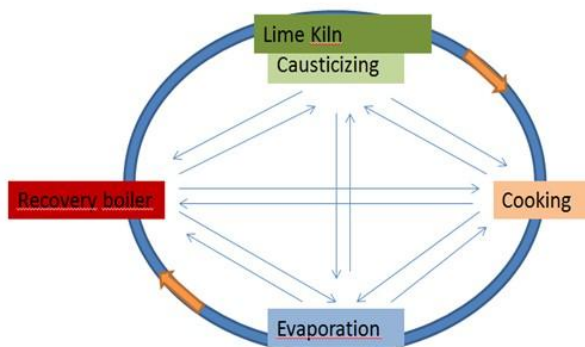
+

Continuous measurements



soft-sensors

- K and Cl enrichment values
- to serve all departments



Adsorption of dissolved and colloidal substances onto paper fillers in paper machine waters

Selin Jukka

Supervisor: Raimo Alén

University of Jyväskylä

Department of Chemistry, Laboratory of Applied Chemistry

Employer: Teollisuuden Vesi Oy – Industrial Water Ltd.

Contact (e-mail): jukka.selin@teollisuudenvesi.fi

Fillers are used in different paper grades to improve the paper products' printability as well as their optical properties, like brightness. However, the prerequisite for achieving such advantageous properties is that the filler surface remains as pure as possible. As fillers are circulating in the wet end of a paper machine, it's possible that various organic materials, lignin, carbohydrates and extractives-derived substances, are adsorbed onto filler surfaces resulting in significant changes in filler surface properties. This phenomenon can be often seen in cases where changes in process conditions occur. For this reason, due to the diminished filler retention, especially the optical properties of paper are weakened.

There are only limited literature data available on the impact of organic materials adhered to filler surfaces. For example, according to these studies, the effect of accumulated organic material on filler surfaces, with respect to the behavior of fillers, has not been studied in detail. The main aim of this research work was to find out what kind of materials can be adsorbed onto filler surfaces, how the surface chemistry of fillers changed, how the bleaching of pulp effected due to this adsorption and how important is the effect of pH on adsorption. These phenomena were first studied in laboratory scale followed then by the full-scale experiments in paper machine environment.

The paper machine waters with PCC, GCC, clay and talc fillers were made for the laboratory experiments. PCC had to different kinds of crystalline forms and therefore, the physical properties of their surfaces were also varied. These experiments were performed both with acidic and neutral paper machine waters. Dispersion waters mainly analyzed in terms of lipophilic extractives, carbohydrates, lignin and distribution of colloidal particles. The surface chemistry of solid filler surfaces was clarified, for example, by ESCA (x-ray photoelectron spectroscopy). Some determinations were also made from paper machine wires. For this reason, it was possible to find out relationships between the laboratory and practical tests. In addition, the effect of various chemicals, such as dispersing agent and electrolyte, on the adsorption of organic materials onto filler surfaces was separately investigated.

Finally, it should be pointed out the results of this research, based on the new point of view, can be applied to industrial problems other than those in the paper industry as well.

REMOVAL OF HEXENURONIC ACID

– 2h at 95°C or 1s at 25°C?

Christian Järnefelt, Andritz Oy
christian.jarnefelt@andritz.com

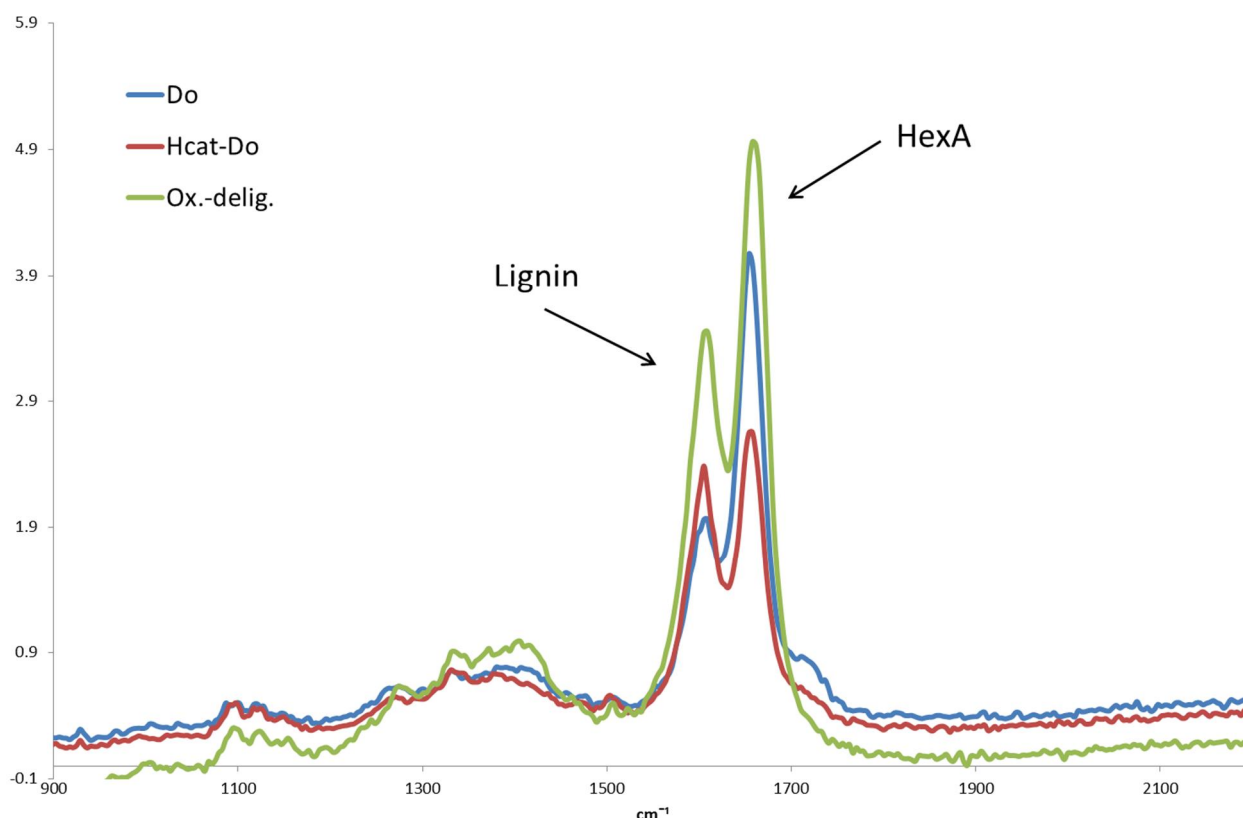


Figure 1: UV-Raman spectra comparing Do and Hcat-Do

The removal of Hexenuronic acid (HexA) is nowadays usually done by acid hydrolysis at a high temperature for some hours. This is efficient, but requires heat and time. In mill-scale this means investments to heating systems and big reactor towers to maintain sufficient retention time.

An alternative for HexA removal is to use hypochlorous acid with the aid of a catalyst (Hcat). This is a highly selective and efficient reaction. The hypochlorous acid reacts solely with HexA leaving the carbohydrates and lignin intact. This allows for the planning of a better functioning bleaching line.

An investigation on the selectivity of a catalytically hypochlorous acid treated pulp was made by comparing a pretreated pulp followed by chlorine dioxide bleaching (Hcat+Do) with one bleached solely with chlorine dioxide (Do). The total active chlorine charge was kept the same for both pulps. The difference in selectivity can be seen in figure 1. By optimizing the charges to be sufficient, HexA and lignin should be removed completely in merely two stages.

The catalyzed reaction is also extremely fast, measured in milliseconds, as can be seen from the model compound studies results in figure 2.

As a conclusion, it can be stated that using Hcat allows for a better and quicker process to remove HexA from the pulp. It is also easy to implement into modern pulp mills, since the reaction happens in the mixer during the mixing process, thus no need for a separate reaction vessel.

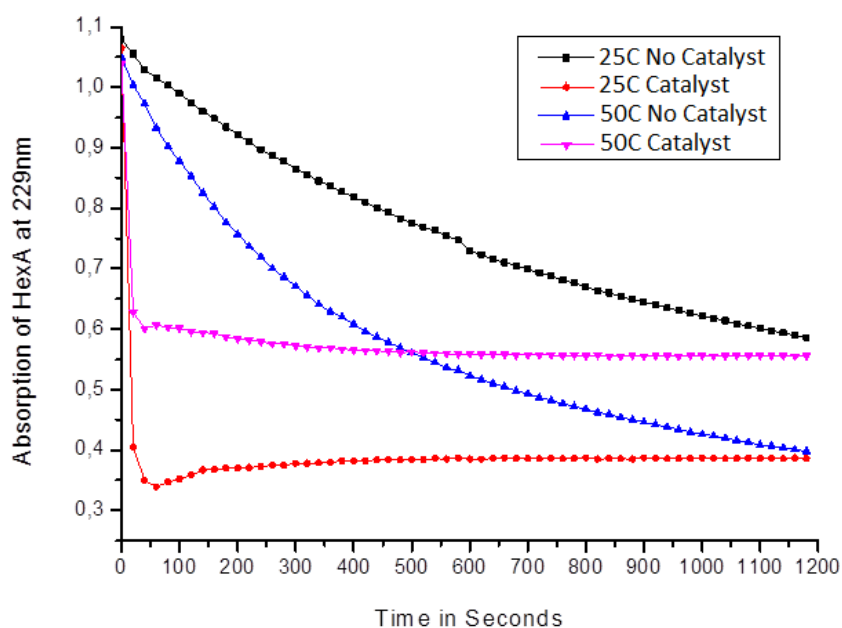


Figure 2: Uv-Vis spectra of HexA model compound experiments (from N. Chenna's work)

Acknowledgements: Andritz Oy, Kemira Oyj, Metsä Fibre Oy, Stora Enso Oyj, UPM-Kymmene Oyj, Aalto University and Tekes

FIBIC networking event at Hanasaari, Espoo, 21th of November 2013

Marica Kilponen

maricakilponen@gmail.com

045-1536005

Study topics

- Bundling logging residues at the roadside landing
 - Slash bundling business - The main differences in Finnish and Spanish market areas and why are they developing differently
 - Slash bundling profitability - The main differences in Finnish and Spanish market areas
 - Future guidelines of forest bioenergy harvesting
 - Multi-tree-handling method in energy wood harvesting
-

Bundling logging residues at the roadside landing

The first study was made in cooperation with Metla and UPM from December 2009 to January 2010. The aim of this case study was to clarify the maximum productivity of logging residue bundling units and cost of logging residue bundling systems at the roadside landing. The article is written together by Juha Laitila and Yrjö Nuutinen, entitled "*Productivity and cost-efficiency of bundling logging residues at the roadside landing*". It is accepted for publication in the *Croatian Journal Of Forest Engineering* journal.

Abstract:

The aim of this case study was to clarify the maximum productivity of logging residue bundling units and the cost of logging residue bundling systems at the roadside landing. In order to find the bundling unit's productivity, a set of timed studies were carried out in which several working techniques were tested and evaluated. The cost-efficiency of the roadside bundling system was compared with the conventional bundling system, wherein the logging of residue logs is made directly in the terrain and, after bundling, the logging residue logs are forwarded to the roadside landing with a forwarder. The harvesting cost (€/m³) of the extracted wood biomass to the roadside landing was calculated for both bundling systems using time study data obtained from this study and productivity models and cost parameters acquired from the literature.

The productivity of roadside bundling ranged from 48 to 53 logging residue logs per effective working hour (E0h), depending on the working technique used, (Period, New Sentence starting with The) and the mean time required to produce one logging residue log ranged from 83.6 to 92.3 seconds (E0h). The harvesting costs of the logging residue logs (€/m³) at the roadside landing were 11.5-13.7 €/m³ for the system based on bundling in terrain and 10.8-17.7 €/m³ for the system based on bundling at the roadside landing when the forwarding distance was in the range 100-600 m and the removal of logging residues was in the range 30-90 m³/ha. According to our results, bundling at the roadside landing allowed a reduction in harvesting costs, when the forwarding distance of the logging residues was 100 m or less and removal was beyond 50 m³/ha. The cost savings were quite small, however, at 0.1-0.7 €/m³.

Slash bundling business - The main differences in Finnish and Spanish market areas and why are they developing differently

The second study is focuses on main business environment differences in slash bundling business between Finland and Spain. The working name of article is "Slash bundling business - The main differences in Finnish and Spanish market areas and why are they developing differently"

Abstract

John Deere Forestry (formerly Timberjack) introduced its first slash bundler TJ1490D to the market in 2002. The bioenergy market was developing rapidly especially in Finland during the first two years, and the bundling method was in use in several other European countries. Thereafter the bundler market has been growing constantly in the many countries, especially in Spain, but in Finland the development of the market has almost come to a stop without any visible change in operations or technology. This has raised interesting question: What are the main differences in the market areas, and why are they developing differently? In an aim to get a better understanding of bundling related business and market differences, all current and former slash bundler customers in Finland and Spain have been interviewed. Results of the study show interesting differences in business models, which directly relate to the overall profitability. Based on these results, it's also obvious that the earlier learning period of using bundles still has a great impact on this method's reputation: the moisture of bundles and cutting of twine are still seen as a challenge, even though there are good examples of power plants who have learned how to use bundles in more efficient ways. Using bundles as part of a logistical solution in the biomass supply chain can offer several benefits to the forest energy sector.

The main differences in business environment are in the amount of operating months in year, the bundled wood spices, the amount of bundles per operation area and the duration of agreement with the bundle's user. Similarities are found in operating radius, dedicated operators and the amount of the bundling units.

Slash bundling profitability - The main differences in Finnish and Spanish market areas

The second phase of slash bundling business study focuses on profitability factors in Finland and Spain. One entrepreneur in both markets was interviewed and they provided us with their economic data. This economical data was fed into the TimberCalc cost calculation software.

The results of the study have been grouped in twelve different cost factors, which are:

<i>Direct costs</i>	<i>Indirect costs</i>
Deductions	Fuel
Interest	Hydraulic oil
Wages	Repair and service
Overhead costs	Saw bars
	Saw chains
	Saw chain oils
	Twine
	Mileage allowance

The comparison has been made in a rate of one produced unit. In Finland direct costs are presenting 53% when in Spain they are 65% of all costs.

Future guidelines of forest bioenergy harvesting

The next study will focus on guidelines of forest bioenergy harvesting in near future. It will be carried out by using delphoi method in the group of specialists.

Background

World energy consumption has doubled between 1973 and 2010, and the climate impact of energy generation and consumption has been one of most important topics of discussion. Especially in the EU, renewable energy sources have been seen as a solution for these climate questions. Development of technology and infrastructure needed in utilization of renewable energy sources has been rapid, and it has been a challenge for industry and leaders to keep up in these changes - both the world and the rules are changing too fast to support long term investment decisions.

Forest bioenergy is one of these renewable energy sources, and varying forms have been developed seeking several solutions to optimize particular logistical challenges. None of these new approaches has made a significant breakthrough, and there are still many unanswered questions.


Study questions

The aim of this study is to review guidelines of forest bioenergy harvesting technology in the near future, when the study questions are following:

1. What is the portion of forest bioenergy fuels in energy generation in the year 2020?
2. From what kind of forest environment are those trees coming from, and which will be used for energy generation?
3. What kind of wood will be used?
4. How will the used wood be measured, and how and which phase of harvesting work will be paid for by the entrepreneur?
5. In what form and how far will the harvested wood be transported?
6. (What kind of machinery will be used for the energy wood harvesting?)

Multi-tree-handling method in energy wood harvesting


The next study will review the usage of the multi-tree-handling method (a.k.a. MTH) in energy wood harvesting. MTH technology had been developed already in the beginning of the 1990s, but has been used broadly only a few years ago. Due to changes in working methods, the use of small size wood in energy generation has more than tripled by increasing from 2 TWh used in 2008 to 7 TWh used last in 2012 in Finland.



FCDP

Forest Cluster Doctoral Program

- The coordinated peer group for supporting and boosting the doctoral studies of people who are working in forest industry alongside their studies.
- Multidisciplinary
- Students from different universities



KEYS TO SUCCESSFUL DOCTORAL STUDIES

- **Motivation: "I want to do my doctoral studies"**
 - What is my reason to study?
 - Importance of my research, and how it fits to the big picture
 - What I can do later, as a doctor?
- **The fluent research process: "I know how"**
 - Clear scheduling, follow-up and updating
 - Methodology and information retrieval
 - Understanding the whole doctoral research process
- **Resources: "Nothing prevents my studies"**
 - Supervision plan
 - Responsibilities /roles of student, supervisor and employer
 - Consensus of research quality
 - Agreement of e.g. time management, financing and publishing of research results
 - Consensus at home
 - Effective use of time
 - Commitment in research and peer group
 - Mutual support
 - Publish research results as co-authors



Aalto-yliopisto
Teknillinen korkeakoulu



FIBIC
FOREST INDUSTRY INNOVATION CLUSTER



UNIVERSITY OF JYVÄSKYLÄ



Open your mind. LUT.
Lappeenranta University of Technology



UNIVERSITY OF OULU
OULUN YLIOPISTO



VTT



Åbo Akademi
University

Results and discussion

FCDP IN PRACTICE

- Orientation period
- Recommendations & information (e.g. havin a supervision plan negotiations)
- Information about scholarships available
- Hands-on –information retrieval, ethics in science etc.
- Intensive or virtual courses about research methodologies and scientific writing
- Seminars about topical themes
- Virtual rsearcher meetings
- Virtual lectures
- Annual FCDP seminar
- Regular follow-up report about doctoral studies
- "Writing tube"
- Virtual homeroom in a closed environment (Moodle)
- Facebook group (closed)
- Announcements about coming doctoral level courses in different universities and interesting dissertations
- Coordinator, who students can contact any time and who also contacts students if they are "lost" too far

EVALUATION OF SUCCESS

- Positive feedback from students
- Results are always not so easy to measure
 - Scientific articles
 - ECTS credits from courses
 - Presentations of research results
- Lively discussion and ideas in seminars and researcher meetings
- Students are voluntarily participating

Coordinator's reflection:

- In principal, we are doing the right things
- Students are active when we meet, hopefully also in between the meetings?
- How to increase the commitment?
- Financing of FCDP has been difficult which reflects in planning the actions beforehand
- Sometimes part-time doctoral studies are diminished by the universities
- More co-operation is needed?

More information: Terhi Virkki-Hatakka, e-mail: tvh@lut.fi



Orientation lectures:

Pekka Belt: Tieteellisen artikkelin kirjoittaminen 13.4. klo 13-16

Pekka Belt: Väitöskirjan kirjoittaminen 23.4. klo 9-12

Aikataulu

Torstai 26.huhtikuuta 2012

Paikka: Lappeenrannan teknillinen yliopisto

- | | |
|-------|---|
| 9.45 | Tapaaminen LUT:n pääaulassa, josta siirrytään yhdessä neuvotteluhuoneeseen 7531 |
| 10.00 | Prof. Kaj Backfolk : Tieteellisten artikkeleiden ja väitöskirjan kirjoittaminen metsäklusterin näkökulmasta (7531) |
| 11.00 | Työhuoneisiin tutustuminen ja <i>Lounas</i> |
| 12.00 | Oman artikkelin/väitöskirjan kirjoittamista kirjoitusputkelle varatuissa työhuoneissa (7. rakennusvaihe, 6. kerros) |
| 13.30 | Prof. Tuomo Kässi : ohjeita artikkelin ja väitöskirjan kirjoittajalle <i>kahvin</i> lomassa (7531) |
| 14.00 | Kirjoittaminen jatkuu (huone käytettävissä vaikka koko yön) |

Perjantai 27. huhtikuuta

- | | |
|-------|--|
| 8.00 | Oman artikkelin/väitöskirjan kirjoittamista |
| 9.00 | Mitä kirjoittajien tulisi erityisesti huomioida kirjoittaessaan englanniksi?
Scott Semken : Language in scientific articles (7630) |
| 10.00 | Oman artikkelin/väitöskirjan kirjoittamista |
| 11.30 | <i>Lounas</i> |
| 12.15 | Oman artikkelin/väitöskirjan kirjoittamista |
| 13.45 | Kahvi (mahdollinen iltapäiväkahvivieras kertoo näkemyksiään tieteellisestä kirjoittamisesta) |
| 14.15 | Oman artikkelin/väitöskirjan kirjoittamista |



Ennakkotehtävät

Tarkempi ohje Liitteessä 1.

1. Mieti yleiskatsaus tutkimukseenne/artikkeliinne
2. Tee projektisuunnitelma kirjoitelmallesi
3. Valmistaudu kirjoittamaan johdanto artikkelillesi
4. Analysoi lehteä, johon kirjoitat

Aikataulu

Torstai 2.toukokuuta 2013

Paikka: Lappeenrannan teknillinen yliopisto

- | | |
|-------|---|
| 9.45 | Tapaaminen LUT:n pääaulassa => kävele portaat ylös aamukahville Sodexon ruokalaan. Peter Jones tulee esittäytymään samalla. |
| 10.15 | Siirtyminen työhuoneisiin
Day 1 Session 1- TASK A
Kirjoittamista omilla työhuoneissa (7. rakennusvaihe, 6. kerros). |
| 12.00 | <i>Lounas Sodexon ruokalan kabinetissa, kirjoittamisohjausta ja -keskustelua samalla</i> |
| 12.45 | Day 1 Session 2 – TASK B
Kirjoittamista omilla työhuoneissa |
| 14.15 | <i>Kahvitauko neuvotteluhuoneessa 7630, kirjoittamisohjausta ja keskustelua</i> |
| 14.45 | Day 1 Session 3 – TASK C
Kirjoittamista omilla työhuoneissa |
| 16.15 | <i>Välipalatauko Sodexon ruokalassa</i> |
| 16.45 | Day 1 Session 4 – TASK D
Kirjoittaminen jatkuu (huone käytettävissä vaikka koko yön) |



Perjantai 3. toukokuuta

- 8.00 Day 2 Session 1 - TASK A
Kirjoittamista omissa työhuoneissa
- 9.30 *Kahvitauko neuvotteluhuoneessa 7531, kirjoittamistukea ja keskustelua*
- 10.00 Day 2 Session 2 - TASK B
Kirjoittamista omissa työhuoneissa
- 11.30 *Lounas Sodexon ruokalan kabinetissa, kirjoittamisohjausta ja -keskustelua samalla*
- 12.15 Day 2 Session 3 – TASK C
Kirjoittamista omissa työhuoneissa
- 13.45 *Kahvitauko Sodexon ruokalassa, kirjoittamisohjausta ja keskustelua*
- 14.15 Day 1 Session 4 – TASK D
Kirjoittaminen jatkuu (huone käytettävissä vuorokauden loppuun)



Ennakkotehtävät

Tarkempi ohje Liitteessä 1.

1. Mieti yleiskatsaus tutkimukseenne/artikkeliinne
2. Tee projektisuunnitelma kirjoitelmaallesi
3. Valmistaudu kirjoittamaan johdanto artikkelillesi
4. Analysoi lehteä, johon kirjoitat

Aikataulu

Torstai 28. elokuuta 2014

Paikka: Lappeenrannan teknillinen yliopisto

- 9.45 Tapaaminen LUT:n pääaulassa. Odottelen teitä oven sisäpuolella, josta jatkamme aamukahville yhdessä.
- 10.15 Siirtyminen työhuoneisiin
Day 1 Session 1- TASK A
Kirjoittamista omilla työhuoneissa (7. rakennusvaihe, 6. kerros).
Peter Jones auttaa tarvittaessa.
- 12.00 *Lounas, kirjoittamisohjausta ja -keskustelua samalla, Peter Jones*
- 12.45 Day 1 Session 2 – TASK B
Kirjoittamista omilla työhuoneissa
- 14.30 *Kahvitauko 7519:ssä, kirjoittamisohjausta ja keskustelua, Peter Jones*
- 14.45 Day 1 Session 3 – TASK C
Kirjoittamista omilla työhuoneissa
- 16.15 *Välipalatauko
(kahvia, teetä, viipurinrinkeliä, hedelmiä, suolakeksejä)*
- 16.45 Day 1 Session 4 – TASK D
Kirjoittaminen jatkuu (huone käytettävissä vaikka koko yön)



FCDP Kirjoitusputki 2014

Perjantai 29. elokuuta

- 8.00 Day 2 Session 1 - TASK A
Kirjoittamista omissa työhuoneissa
- 9.30 *Kahvitauko, kirjoittamistukea ja keskustelua, 7519*
(kahvia, teetä, keksejä)
- 10.00 Day 2 Session 2 - TASK B
Kirjoittamista omissa työhuoneissa
- 11.30 *Lounas, kirjoittamisohjausta ja -keskustelua samalla, Marja Talikka*
- 12.15 Day 2 Session 3 – TASK C
Kirjoittamista omissa työhuoneissa
- 13.45 *Kahvitauko, kirjoittamisohjausta ja keskustelua, Iris Tahvanainen, 7519*
- 14.15 Day 1 Session 4 – TASK D
Kirjoittaminen jatkuu (huone käytettävissä vuorokauden loppuun)

'KIRJOITUSPUTKI' PREPARATION – CONFERENCE CALL NOTES

Instructions by Peter Jones

Pre-writing tasks are generally very simple:

A) OVERVIEW TASK

- i) Why is your research necessary?
- ii) What did you do?
- iii) What happened when you did it?
- iv) What do the results mean in theory?
- v) What do the results mean in practice?
- vi) What remains unresolved?
- vii) What is the novelty/contribution of your paper to field?

B) MAKE A PROJECT PLAN FOR WRITING YOUR PAPER

As you are working intensively, you might consider writing the plan in the form:

Day 1: Session 1 - TASK A
 Session 2 - TASK B
 Session 3 - TASK C
 Session 4 - TASK D

Day 2: Session 1 - TASK...
 Session 2 - TASK ... etc

- You should send a copy of your plan to all other students on the 'kirjoitusputki'.
- Then, at the end of each session, before going for coffee, you have to write what is the first thing you are going to do at the start of the next session. This task must be

done at the end of each day, so that you get a flying start to the next day and do not spend time thinking about what to do.

- 1) Aim of the plan: To avoid 'displacement activities'.
- 2) Reason for making the plan public: Social pressure as a motivating factor.

Targets: Use quantifiable targets. (For example, "Write 150 words about parameter estimation and multiobjective optimization methods.")

C) PREPARE TO WRITE THE INTRODUCTION TO YOUR ARTICLE BY ANSWERING THE QUESTIONS BELOW

i) Why is the topic of the research useful, relevant or worth investigating?

Provide evidence to support your claim.

ii) What is the current state of knowledge in the field?

Give evidence (i.e. references) to support your claim.

iii) What has been found or claimed and who found it or claimed it?

This is a review of previous research. Remember to give evidence to support any statements.

iv) Answer one or more of the next four questions.

What are the weaknesses of previous research?

What aspects have been omitted or forgotten in previous research?

What questions remain unanswered by previous research?

What work still needs to be done?

v) What is the main aim of your study?

vi) What does the paper/research do?

vii) What are the main findings of the research?

viii) What are the limitations of your study?

ix) How is the paper structured?

ANALYZING JOURNALS

Introduction

When writing your article, in addition to knowing what you want to say (message) you need to know to whom your message is addressed (receiver) and via what channel it is to be sent (e.g. type of journal). The channel is important since it determines the form of the message.

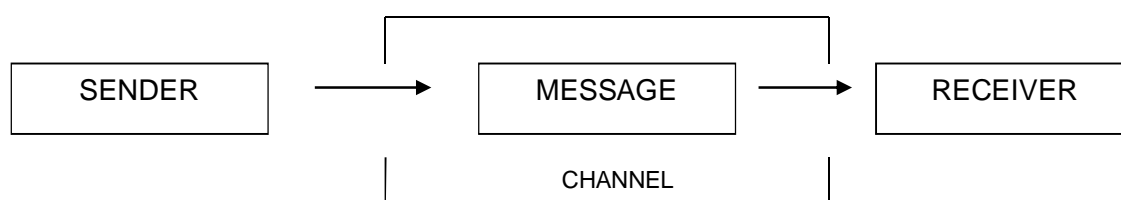


Figure 1: Basic Model of Communication

How to analyse a journal

Read the full instructions for authors

Check the website. Read the titles and abstracts.

Skim and scan the last few issues for topics and treatments.

List the headings and sub-headings used in two or three papers.

How long are the papers?

How are the papers divided up; number of words per section, proportion of the whole paper?

Discuss your analysis with a colleague and discuss whether your subject is likely to be suitable.

If you feel that the journal is suitable for your work, you should analyse the journal a little further. The best place to start is by analysing a number of abstracts (6-10).
Logic: Abstracts are short and they should reflect the structure of the paper.

<u>Things to look for when analysing abstracts</u>
Overall structure Remember that the vast majority of papers follow a basic IMRD format (Introduction, Method, Results, Discussion) but this can be divided into elements, e.g., rationale, aims, methods, results, meanings, or my favourite: background, objectives, methods, results, implications (BOMRI).
How does the abstract start?
What proportion of the abstract is taken up by the results?
How much of the abstract is background?
Look for phrases like; "This paper VERB..." "The findings VERB..." "The results VERB..." It is concluded that ..." What verbs are used?
How is the information gap presented?
What are the first few words?
What is the last sentence?
Any other interesting things?

TIME MANAGEMENT TIPS

- 1) Task List 1 – try to keep a list of tasks that you have to do; it will help you keep focused.
- 2) Task List 2 – the last task of any day is to decide what you will do at the start of the next day.
- 3) Write in small chunks – do not try to write the paper from start to finish. Have a clear outline of the paper and choose whichever section feels best and write something for that section. You can edit the text later.
- 4) Targets – set daily targets, e.g.; “Today, I’ll write *n* words about *subheading N.n.*” Or; “Today, I’ll complete *Figure n* and the description around it.”
- 5) Do not switch on your email programme until one hour before you wish to go home.

Things to do if you get stuck

1) Make a diagram – make a spidergram (or concept map) or a hierarchical list; or change a hierarchical list to a spidergram or vice versa.

2) Forced writing 1 – force yourself to start writing by completing one of the sentences below:

What I want to write about next is

I have identified a problem with

3) Forced writing 2 – force yourself to write a paragraph following the structure given below:

Topic sentence:

Elaborate/Define your terms:

Give an example/illustration/evidence:

Say how your example makes the point in your topic sentence:

4) Forced writing 3 – force yourself to write non-stop for five minutes. Then repeat. Then start writing your paper for real.

MISCELLANEOUS

Julkaisufoorumi

Publication Forum website: www.tsv.fi/julkaisufoorumi

- Use the 'hakusivu' to check the journal classification.

Citation Index

Use the LUT library Nelli portal to find the citation index of journals.

Route: Nelli-portaali → Tietokannat → J → Journal Citation Reports

Please view citation indices with care. Although important, they do not tell the whole truth and nothing but the truth.

Please also note that the QUALITY of the references in your article or thesis is important. An article in a high-status peer-reviewed journal is considered a quality reference. Do not rely too much on conference articles and theses as these are considered lower quality references. One of the first things that experienced referees do is to look at the references to see whether the references they expect to see are included. It is sometimes claimed that the quality of your references reflects the quality of your research and is an indication of your professionalism as a researcher.



FCDP October'12 seminar & The Article Afternoon

The Article afternoon is arranged by Forest Cluster Doctoral Program in co-operation with Aalto university. The lectures are open to all doctoral students and researchers who are interested in publishing articles in Scientific journals.

The seminar afternoon is free of charge but for the arrangements, please register by e-mail: terhi.virkki@lut.fi

FCDP October'12 seminar

FCDP students only

*Paikka: Kuitu, PUU 1, Tekniikantie 1, Espoo
puheenjohtaja: Terhi Virkki-Hatakka*

- 9.45 Ilmoittautuminen ja aamukahvi
- 10.00 Katsaus FCDP:n opiskelijoiden tutkimuksiin (n. 25 min/esitys)
- Marica Kilponen (osallistuu etänä): Hakkuutähteen paalaus liiketoimintana
- Christian Järnefelt: Lehtipuuselluloosakuidun katalyyttinen valkaisu
- Jukka Rantamäki: A case of combining data mining, design of experiments and simulation in pulping process
- Olavi Pöyhönen: Paperin formaation osa-alueet ja niiden tutkiminen
- Juha Paavilainen: Liuotuspesun tehokkuuden tutkiminen keraamisella kiekkosuodattimella
- Heikki Lappalainen: Prosessidatan keruun haasteita
- 12.45 Lounas



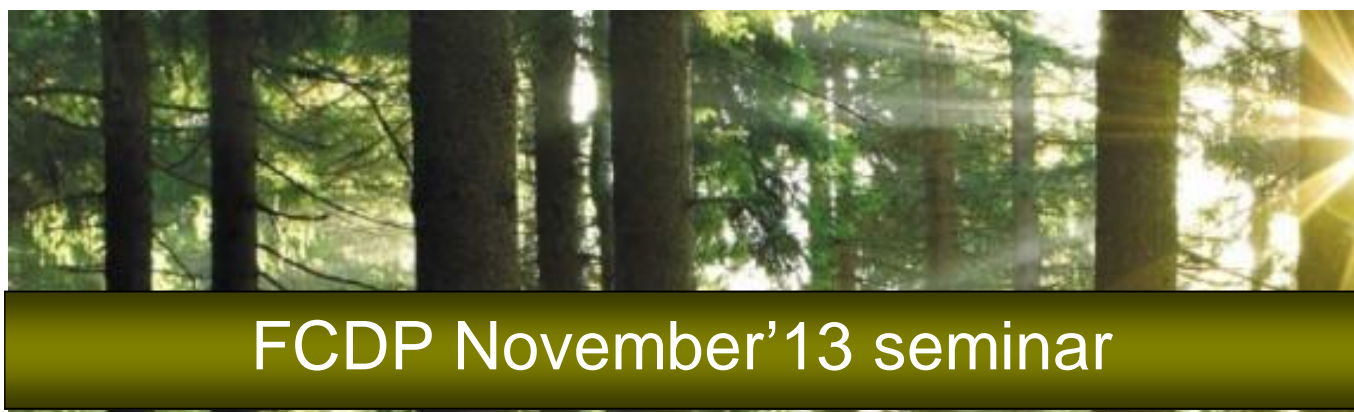
The Article Afternoon , Open seminar

place: Lecture room 1 / PUU1

chair: Tapani Vuorinen

- 13.30 *Doctoral student, lecturer Jaana Suviniitty: Reading and writing of scientific articles from a researcher's perspective*
- 14.15 *Professor Peter Lund: Publishing of scientific articles; the process as a whole, impact factors, competition between different journals etc*
- 15.00 *Director Ritva Dammert (Strategic support for research and education): The importance of scientific articles to the university*
- 15.45 Summary, end of the day





Ohjelma

Torstai 21.11.2013

Aalto-yliopisto, "PUU1", Pieni luentosali, Vuorimiehentie 1, Otaniemi

Puheenjohtaja: Terhi Virkki-Hatakka

- 13.20 Tervetuloa FCDP'13 seminaariin
- 13.30 *Christian Jämfelt: Catalytic bleaching of eucalyptus pulp*
- 14.00 *Marica Kilponen: Metsäenergian Korjuun Tulevaisuuden Suuntaviivat*
- 14.30 *Heikki Lappalainen: Soodakattila: Lämpöpintojen likaantumisen ennakointi talteenoton mittauksista*
- 15.00 Tauko
- 15.15 *Juha Paavilainen: New Washing Method of Ceramic Filter Plates - Good filter performance with lower wash acid consumption*
- 15.45 *Olavi Pöyhönen: Paperin formaation ja konekonfiguraation yhteys*
- 16.15 *Jukka Rantamäki: Estimation of log loading performance in industrial debarking for kraft pulping process*
- 16.45 *Lopetus ja keskustelua*





FCDP'14 seminaari

Ohjelma

Perjantai 9.1.2015

Lappeenrannan teknillinen yliopisto

Puheenjohtaja: *Terhi Virkki-Hatakka*

Klo 10.00 Tapaaminen yliopiston aulassa ja siirtyminen yliopiston ravintolan kabinettiin

- Kuulumiset
- Väitöspäivän aamun vaiheet
- Väitökseen valmistautuminen
- Kevyt aamupäiväpala

Klo 11.30 alkaen Väitöstilaisuuden simulaatio luokahuoneessa

- Videopätkiä marraskuussa 2014 olleesta väitöstilaisuudesta; sisääntulo, avaus, loppulausunto jne
- "Viralliset lauseet", jotka väitöstilaisuudessa on sanottava

Läsnäolijoiden Lectio praecursoriat (tässä yksi ohje:

<https://into.aalto.fi/display/endoctoraltaik/Lectio+Praecursoria>) , joiden jälkeen vastaväittäjien ja yleisön kysymykset & vastaukset

Klo 12.00 Jukka Rantamäki (etänä)

Klo 12.45 Heikki Lappalainen

Klo 13.30 Christian Järnefelt

Klo 14.15 Juha Paavilainen

Klo 15.00 Olavi Pöyhönen

Tämän jälkeen väitöskahvit yliopiston ravintolassa.

Karonkkasimulaatio hyvän ruoan, juoman ja seuran merkeissä Lappeenrantalaisessa ravitsemusliikkeessä alkaen n. klo 17, tai aikataulun mukaan joutaen.

- karonkkapuheet
- Miten tästä eteenpäin

Forest Cluster Doctoral Program

Opintojen edistymisraportti

Päivämäärä:

Opiskelija:

1. Tähän mennessä suoritettut kurssit ja opintopisteet:

kurssi	opintopistemäärä	pääainekurssi vai muu

2. Kirjoitatko monografia vai nippuväitöskirjaa?

Artikkelit (julkaistut että työn alla olevat)

Kirjoittajat	Nimi	missä julkaistu	Lehden numero/ ajankohta

3. Aikataulu ja päivitetty projektisuunnitelma

Arvioitu valmistumisajankohta:

Työn tulevat vaiheet

mitä tehdään	ajankohta	edellytykset vaiheen tekemiselle (esim. jonkin toisen vaiheen valmistuminen ensin)

4. Mahdollisen ohjausryhmän jäsenet (*nimi, toimenkuva ja organisaatio*)

5. Muuta