



THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Applied Science

ADVANCED PAPERMAKING INITIATIVE

ANNUAL REPORT

April 1, 2016 – March 31, 2017

Prepared for Advanced Papermaking Initiative (API)

Dr. Mark Martinez, Director

Professor in Chemical and Biological Engineering

Director of the Pulp and Paper Centre

Your support continues to
make a vast difference to
our students, faculty and
community.

Thank you.

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Introduction

The mission of the Advanced Papermaking Initiative (API) is to enhance post-secondary education and research for the paper industry of British Columbia. The API supported the creation of:

- Two faculty positions at UBC — Professors James Olson in Mechanical Engineering and Mark Martinez in Chemical and Biological Engineering, and
- One faculty position at BCIT — Dr. Rodger Beatson.

Professor Peter Englezos, a faculty member and Head of the Department of Chemical and Biological Engineering at UBC, is also a faculty member of the API.

This XIX Annual Report provides an overview of the activities of the API-funded faculty for the reporting period of April 1, 2016 to March 31, 2017. Research carried out at UBC's Pulp and Paper Centre (PPC) is industry relevant and focuses on efficient processes that advance the research and partnerships of the Advanced Papermaking Initiative, Energy Reduction in Mechanical Pulping and Forest Bio-Products.

The Master of Engineering Leadership (MEL) program in Green Bio-Products was successfully launched in January 2016. Our first cohort of five students of the inaugural program graduated in December 2016. Three graduates stepped into the workforce in energy consulting and forestry products and one is actively exploring opportunities. One graduate continues to expand his academic qualifications at UBC as a PHD student in Wood Science. A fresh cohort of three students — two with industry experience — are enrolled in the current 2017 MEL program.

The API faculty has been pursuing its Forest Bio-Products program with industry with the end goal of ensuring that the forestry sector in British Columbia, in Canada and globally has the high-quality professionals (HQP) it needs to transition from the traditional pulp and paper manufacturing into new bio-economies.

API Structure



Mark Martinez
Director, API

The API is led by a Director, appointed by the Dean, and advised by a Management Committee consisting of API faculty. An Advisory Group of industry executives also provides advice to the Director and Dean on the API's activities in meeting its mandate.

The key personnel are:

Dean, Applied Science:	Dr. Marc Parlange
Director of API:	Dr. D. Mark Martinez

Management Committee:

This committee consists of the faculty associated with the API

Dr. Rodger Beatson
Dr. Peter Englezos
Dr. Mark Martinez
Dr. James A. Olson

Advisory Group:

Mr. Paul Bicho, Canfor Pulp Ltd. Partnership
Ms. Shannon Huntley, FPIInnovations
Mr. Carol Lapointe, Domtar
Mr. George Milosevich, Catalyst Paper
Mr. Tobias Ziegenbein, Mercer International

API Faculty— Biographies



Rodger Beatson holds a B.Sc. Honours (1968) in Chemistry from the University of Exeter, Devon, England. He obtained his Ph.D. in Organic Chemistry from the University of Western Ontario, London, Ontario in 1975. He began working for the API in 1999 as faculty member at BCIT. Rodger served as the Chairman of the PAPTAC Research committee in 1994 and has been Adjunct Professor in the Faculty of Forestry since 1995. Dr. Beatson's current research interests are dissolving pulp production, the use chemicals to reduce energy consumption in refining and the recovery of hemicellulose from mill residues for use in improving beatability and enhancing paper strength.



Peter Englezos holds a Ph.D. in Chemical Engineering from the University of Calgary (1990). In September 1990, he joined the Department of Chemical Engineering at UBC as Assistant Professor. He served as Coordinator of the Master of Engineering, non-thesis Pulp and Paper Program during 1992–99. Peter was Director of the Advanced Papermaking Initiative between July 2005 and August 2011. He became the inaugural holder of the Advanced Papermaking Professorship in December 2007. Peter was appointed Head of the Department of Chemical and Biological Engineering in July 2009. He is a registered Professional Engineer in British Columbia and a member of the Canadian Academy of Engineering. His current research interests span engineering wood fibres for novel product development, novel gas separation technologies for hydrogen production and carbon dioxide capture, water desalination and natural gas hydrates.



Mark Martinez holds a Ph.D. in Chemical Engineering from The University of British Columbia (1995) and a Docent in Paper Technology (1999) from the Royal Institute of Technology, Sweden. He joined the Chemical Engineering Department at UBC in 1999 after four years at the Swedish Pulp and Paper Research Institute, Stockholm, as Senior Research Associate for the paper technology group. Mark was appointed Director of the UBC Pulp and Paper Centre at the start of 2014, and has stewarded the Advanced Papermaking Initiative as Director since 2011. His research focuses on the fluid mechanics of fibre suspensions. Recognition of Mark's research comes from numerous awards including the 2009 BCIC Lieutenant Governor's Award for Innovation. Mark is a registered Professional Engineer in British Columbia.



James A. Olson holds a B.A.Sc. in Engineering Physics (1991) and a Ph.D. in Chemical Engineering from the University of British Columbia (1996). He joined the Mechanical Engineering Department at UBC in July 1999 as Assistant Professor. James was appointed Director of the UBC Pulp and Paper Centre in 2011 and since early 2014, has been serving as Associate Dean of Research and Partnerships at the Faculty of Applied Science. His research is in the areas of advanced pulp processing, screening, LC refining, fibre and paper properties, and the fluid mechanics of fibre suspensions. He leads a \$4 million research program to reduce electrical energy in mechanical pulping and another research group on the development of novel biomaterials. James is a registered Professional Engineer in British Columbia. He was elected Fellow of the Pulp and Paper Technical Association (PAPTAC) recently in 2017.

API Faculty — Teaching

The API presents a number of courses at three different post-secondary institutions in British Columbia — the University of Victoria, the British Columbia Institute of Technology and the University of British Columbia.

Peter Englezos taught the Chemistry and Biological Engineering (CHBE) course 243 to 126 students with lectures totalling 12 hours. He gave guest lectures in CHBE 364/365/366 to cover 115 students and 2 hours, and the CHBE course 483 to 45 students of 1 hour duration. Course descriptions are available at <http://www.calendar.ubc.ca/vancouver/courses.cfm?code=CHBE>. Peter presented lectures at the API Course to 20 students for 3½ hours.

Rodger Beatson instructed 54 students for 3 courses in Chemical and Environmental Technology (CENV) — #3346, 4400 and 4403 — at BCIT covering Paper and Chemicals from Renewable Resources, Research Projects and Process Simulation. The link <http://www.bcit.ca/study/programs/537bdiplt#courses> provides the course descriptions.

Mark Martinez conducted the course CHBE 251, Transport Phenomena 1 on Fluid Mechanics with 39 hours of instruction provided. Mark supervised the research work of 8 doctoral students and co-supervised 2 graduate students.

UBC Instructor Dr. Barbara Dalpke delivered 37.5 hours of instruction over 14 weeks for the 3-credit course, MECH 450, Pulp and Paper Technology to 7 (four 4th year and three graduate) students of the University of Victoria, taught by video link.

Dr. Nuwan Sella Kapu taught courses in the Chemical & Biological Engineering undergraduate program and the new MEL Green Bio-Products (MEL-GBPR) professional program. He delivered 42 hours of CHBE 402/GBPR 501, Biomass Fractionation Technology/Biomass Conversion Chemistry to 25 students (21 undergraduate and 4 graduate students). Dr. Sella Kapu also taught GBPR 500: Building Blocks of Forest Biomass for 84 hours to 3 students. In the winter term of 2016, Dr. Kapu developed a laboratory course and guided the MEL-GBPR students in the laboratory component of GBPR 503.

James Olson is involved in developing new undergraduate technical elective courses aimed at a wide range of undergraduate engineering students.

Visiting scholars and scientists included Dr. Jens Heymer of Aikawa Fiber Technologies, Montreal and Professor Mousa Nazhad of Asian Institute of Technology, Bangkok. Carlos Negro and Angeles Blanco came from the Complutense University of Madrid, Spain.

API Faculty — Teaching

Master of Engineering Leadership (MEL) in Green Bio-Products

The Faculty of Applied Science offers a suite of Master of Engineering Leadership (MEL) programs that focus on sustainability and industry. Eight post-secondary degree programs — including the Green Bio-Products program championed by Dr. Mark Martinez — launched in January 2016.

The one-year, full-time Master degree program in Green Bio-Products is offered by the Faculty of Applied Science in collaboration with the Faculty of Forestry and the Sauder School of Business. It is designed for practising professionals who want to invest in their careers, broaden their technical perspectives and gain new business and leadership skills.

Unique in North America, each MEL degree program was developed in close collaboration with industry and designed to equip participants with a suite of practical, hands-on skills training in demand by top employers. In addition to advancing participants' technical skills, the programs offer co-op work placements, professional development workshops and individual coaching to enhance leadership skills.

GREEN BIO-PRODUCTS

BECOME A GREEN BIO-PRODUCTS ENGINEERING EXPERT

If you're thinking about concentrating your career in the green bio-products sector, think about the difference a year at UBC can make. Build knowledge. Cross disciplines and boundaries. Gain confidence. Master the leadership skills that will take you to the next level. Invest in yourself, and in the growing bio-economy, at UBC.

mel.ubc.ca

MEL

Master of
Engineering
Leadership

API Faculty — Research

The research contributions of API faculty members span diverse fields of applications useful to the pulp and paper industry, the forestry industry as well as the oil and gas sector. Under the faculty's stewardship, a number of large and exciting proposals were championed on behalf of the industry. This included proposals to Canadian Foundation for Innovation (CFI) and Canada Excellence Research Chair (CERC) aimed at bringing a world-class infrastructure and researchers to UBC.

API faculty members currently conduct research in the following areas:

- Mechanical pulping
- Stock preparation
- Papermaking and papermaking chemistry
- Chemical pulping
- Novel bio-materials

Over the past year, API members supervised a combination of 24 graduate students, research assistants and postdoctoral research fellows. They published 9 co-authored scientific, peer reviewed articles, and presented papers at 14 international conference proceedings.

The following projects are just a sample of the research that API faculty have been involved in over the past year:

Rodger Beatson extended research studies and analyses in these areas:

- Energy reduction in mechanical pulping

With fellow researchers, Post-Doctoral Fellow Yu Sun, Research Associate Harry Chang The latest research explored the effects of highly alkaline peroxide treatment of screened rejects from primary refined TMP. The treated rejects were then refined at low consistency. The treatment reduced the energy requirement—to a given tensile—in LC refining by 50 per cent. The treatment reduced fibre cutting during LC refining and led to a doubling of the tear strength. Other research focused on the use of two-stage alkaline peroxide treatment to optimize strength gain, brightness and energy savings.

- Recovery of hemicellulose from mill residues and their use to enhance paper strength

With fellow researcher, Prof. Heather Trajano (UBC)

Mill residues such as hog fuel are generally burnt in boilers to provide a source of heat and steam. These residues contain high-value chemicals such as extractives and hemicelluloses.

Hydrolysis of three different softwood residues, chip fines, hog fuels and primary sludge were investigated as a means of producing hemicellulose polysaccharides for use as strength additives. It was demonstrated that the application of Locust Bean Gum (LBG) to kraft pulp could save approximately half the refining energy required to obtain a given tensile strength.

- Production of dissolving pulp from bamboo

With fellow researcher, Prof. D. Mark Martinez (UBC)

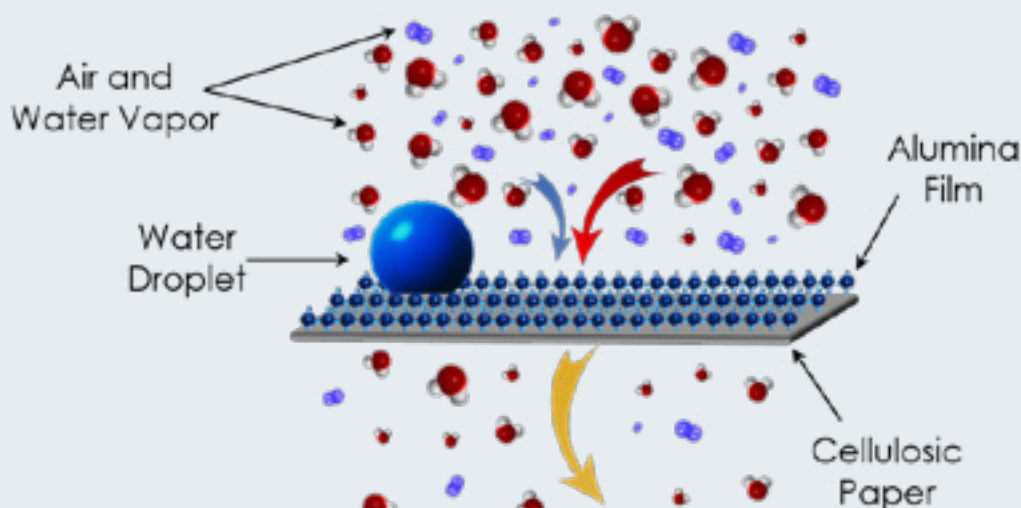
High silica content in bamboo is a major obstacle in using bamboo as a raw material. In pulping applications, silica precipitation causes scaling problems in multiple effect evaporators. In addition, residual silica in pulp deteriorates viscose filterability and interferes with the spinning process. Recent work has shown the feasibility of reducing silica content entering the digester by chip treatment with water and alkali allowing the production of high-grade dissolving pulp. A process was developed to recover the silica and hemicellulose from the alkali treatment liquors for potential use in value-added products.

In other research, it was demonstrated that mechanical treatment of kraft fibres when combined with enzymatic treatment can enhance hemicellulose removal thus providing dissolving pulps suitable for high grade applications such as cellulose acetates.

Peter Englezos collaborated with with fellow researchers Mehr Negar Mirvakili, Hao Van Bui, J. Ruud van Ommen, and Savvas G. Hatzikiriakos

Enhanced Barrier Performance of Engineered Paper by Atomic Layer Deposited Al_2O_3 Thin Films

The research demonstrated that coating of papers prepared with long fibres efficiently reduced wettability with slight enhancement in gas permeability. On shorter fibres, it resulted in significantly lower gas permeability. Wettability studies on Al_2O_3 deposited paper substrates have shown water wicking and absorption over time, only in papers prepared with highly refined fibres.



Peter's research with fellow researchers Mehr Negar Mirvakili and Savvas G. Hatzikiriakos. **Effect of Fibre Size on Wettability and Barrier Performance of Hydrophobic Cellulosic Papers** Cellulosic handsheets prepared by unrefined and highly refined Kraft and thermomechanical pulps were rendered hydrophobic by a chemical deposition technique. A wide range of fibre sizes (177-927 μm for kraft and 139-520 μm for TMP) were examined, and the effect of treatment on wettability and gas permeability of the handsheets was investigated. The contact angles on handsheets prepared with unrefined fibres were significantly larger than those of refined ones after treatment due to their higher surface roughness. The highly refined fibres resulted in handsheets with significantly lower gas permeability.

Mark Martinez's research concentrates on flow visualization in optically dense fluids and suspensions. His special interest in fluid physics is with non Newtonian fluids and papermaking suspensions that focused on:

- (i) understanding the transition to turbulence in viscoplastic fluids
- (ii) understanding the behaviour of yield stress fluids near their yield point and
- (iii) flocculation behaviour of rigid, non-Brownian, fibre suspensions.

He used both computational and experimental methods to elucidate the mechanism under question.

James Olson continues his fundamental research to develop an understanding of the behaviour of turbulent fibre suspensions and leads research clusters in novel biomass products.

Publications

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Yuan, Zhaoyang, Nuwan S. Kapu, Rodger Beatson, Xue Feng Chang, and D. Mark Martinez. 2017. "Effect Of Alkaline Pre-Extraction Of Hemicelluloses And Silica On Kraft Pulping Of Bamboo (*Neosinocalamus Affinis* Keng)". Industrial Crops and Products 91: (2017):66-75. <http://dx.doi.org/10.1016/j.indcrop.2016.06.019>

Yuan, Zhaoyang, Yangbing Wen, Nuwan Sella Kapu, Rodger Beatson, and D. Mark Martinez. "A Biorefinery Scheme to Fractionate Bamboo into High-Grade Dissolving Pulp and Ethanol". Biotechnology For Biofuels 10 no.1 (2017): doi:10.1186/s13068-017-0723-2.

Yuan, Zhaoyang, Yangbing Wen, Nuwan Sella Kapu, Rodger Beatson, and D. Mark Martinez. "An Eco-friendly scheme to Eliminate Silica Problems during Bamboo Biomass Fractionation". Nordic Pulp and Paper Resource Journal. 32 no.1 (2017).

Zhao, Lingfeng, Zhaoyang Yuan, Nuwan Sella Kapu, Xue Feng Chang, Rodger Beatson, Heather L. Trajano, and D. Mark Martinez. "Increasing Efficiency of Enzymatic Hemicellulose Removal from Bamboo for Production of High-Grade Dissolving Pulp". Bioresource Technology. 223: (2017):40-46, doi:10.1016/j.biortech.2016.10.034.

Kapu, Nuwan Sella, Zhaoyang Yuan, Xue Feng Chang, Rodger Beatson, D. Mark Martinez, and Heather L. Trajano. "Insight Into The Evolution Of The Proton Concentration During Autohydrolysis And Dilute-Acid Hydrolysis Of Hemicellulose". Biotechnology For Biofuels 9 no.1 (2016):doi:10.1186/s13068-016-0619-6.

Mirvakili, Mehr Negar, Hao Van Bui, J. Ruud van Ommen, Savvas G. Hatzikiriakos, and Peter Englezos. "Enhanced Barrier Performance of Engineered Paper by Atomic Layer Deposited Al₂O₃ Thin Films". ACS Applied Materials & Interfaces 8 no.21 (2016):13590-13600. doi:10.1021/acsami.6b02292.

Mirvakili, Mehr Negar, Savvas G. Hatzikiriakos, and Peter Englezos. "Effect of Fibre Size on Wettability and barrier Performance of Hydrophobic Cellulose Papers". Journal of Science & Technology for Forest Products and Processes 5 no.4 (2016):38-44.

Sun, Duo, and Peter Englezos. "Determination Of CO₂ Storage Density In A Partially Water-Saturated Lab Reservoir Containing CH₄ From Injection Of Captured Flue Gas By Gas Hydrate Crystallization". The Canadian Journal Of Chemical Engineering 95 no.1 (2016):69-76. doi:10.1002/cjce.22655

Conference Proceedings

Li, Keana, Pouyan Jahangiri, Nicholas A. Zacchia, Trevor Uittenbosch, Ken Buckley, D. Mark Martinez, and Cornelia Hoehr. "Modular design for a liquid target". Paper presented at National Collegiate Research Conference. Harvard, USA. January 19–21, 2017.

Chang, Xue Feng, Meaghan Miller, Yu Sun, James A. Olson, Rodger P. Beatson. "A pilot scale comparison of the effects of chemical treatments of wood chips on the properties of high freeness TMP". Paper presented at the International Mechanical Pulping Conference, Jacksonville, Florida, USA, September 26–28, 2016: 362-380.

Chen, Jingqian, Xue Feng Chang, Xinyi Chen, Rodger P. Beatson, Heather L. Trajano. "Optimization and Modelling of Hemicellulose Oligomers Production from Pulp Mill Residues for use as Pulp Strength Additives." Paper presented at the PACWEST Conference, Jasper, Canada, June 8–11, 2016.

Dunning, Chelsea, Clay Lindsay, Nick Unick, Vesna Sossi, D. Mark Martinez, and Cornelia Hoehr. "Treatment Verification of a 3D-printed Eye Phantom for Proton Therapy". Poster 40 presented at 62nd Annual Scientific Meeting of the Canadian Organization of Medical Physicists. St. John's, Newfoundland, Canada. July 20–23, 2016.

Golkhosh, Farzin, Majid Targhagh, Yash Sharma, André Phillion, D. Mark Martinez, Wendy Tsai, Loic Courtois, David Eastwood, and Peter Lee. "Three dimensional structure and strength characterization of northern bleached softwood kraft pulp". Paper presented at the Progress in Paper Physics Seminar. Darmstadt, Germany. August 22–26, 2016.

Jahangiri, Pouyan, and D. Mark Martinez. "Pressure rise in water targets". Paper presented at 16th International Workshop on Targetry and Target Chemistry. Santa Fe, New Mexico, August 29–September 1, 2016.

Jahangiri, Pouyan, Suzanne E. Lapi, Julia Publicover, Ken Buckley, D. Mark Martinez, Thomas J. Ruth, and Cornelia Hoehr. "Modeling pressure rise in gas targets". Paper presented at 16th International Workshop on Targetry and Target Chemistry. Santa Fe, New Mexico, August 29–September 1, 2016.

Li, Keana, Pouyan Jahangiri, Nicholas A. Zacchia, Trevor Uittenbosch, Ken Buckley, D. Mark Martinez, and Cornelia Hoehr. "Modular design for a liquid target". Paper presented at the 16th International Workshop on Targetry and Target Chemistry. Santa Fe, New Mexico, August 29–September 1, 2016.

Mirvakili, Mehr Negar, Hao Van Bui, J. Ruud van Ommen, Savvas G. Hatzikiriakos, and Peter Englezos "Atomic Layer Deposition of Al₂O₃ on Cellulosic Paper". Paper presented at the 16th International Conference on Atomic Layer Deposition, Ireland, England. July 2016.

Nikbakht, Abbas, D. Mark Martinez, James A. Olson. "Observations of transition from plug flow to well-mixed flow of papermaking fibre suspensions". Paper presented at the PaperCon Cincinnati, Ohio. May 15–18, 2016.

Paterson, Daniel T, Duncan R. Hewitt, Neil J. Balmforth, D. Mark Martinez. "Understanding rapid dewatering of fibre suspensions". Paper presented at the PaperCon Cincinnati, Ohio. May 15–18, 2016.

Sun, Yu, Meaghan Miller, Chang Xue Feng, James A. Olson, Rodger P. Beatson. "A pilot scale comparison of the effects of chemical pre-treatments of wood chips on the properties of low consistency refined TMP." Paper presented at the International Mechanical Pulping Conference, Jacksonville, Florida, USA, September 26–28, 2016: 405-416.

Conference Proceedings

Yuan, Zhaoyang, Nuwan S. Kapu, Xue Feng Chang, Rodger P. Beatson, D. Mark Martinez. "Effect of Alkaline Pre-extraction of Silica and Hemicellulose on the Kraft Pulping of Bamboo". Paper presented at the 2016 PACWEST Conference, Jasper, Canada, June 8-11, 2016.

Zacchia, Nicholas A., D. Mark Martinez, and Cornelia Hoehr. "Foil degradation in liquid targets irradiation low pH salt solutions". Paper presented at the 16th International Workshop on Targetry and Target Chemistry. Santa Fe, New Mexico, August 29-September 1, 2016.

Community Outreach

PPC's 30th Anniversary Open House

The Pulp and Paper Centre (PPC) celebrated its 30th Anniversary on May 28 — which also happened to be the wettest day of 2016 — and in fact, the wettest day in May in more than 15 years. But the rain wasn't enough to keep the crowds away nor dampen their spirits! Close to a hundred people gathered on campus for the PPC's Open House that included keynote speeches, interactive lab tours, a Poster Session, papermaking labs and an opportunity to reconnect and network with peers.

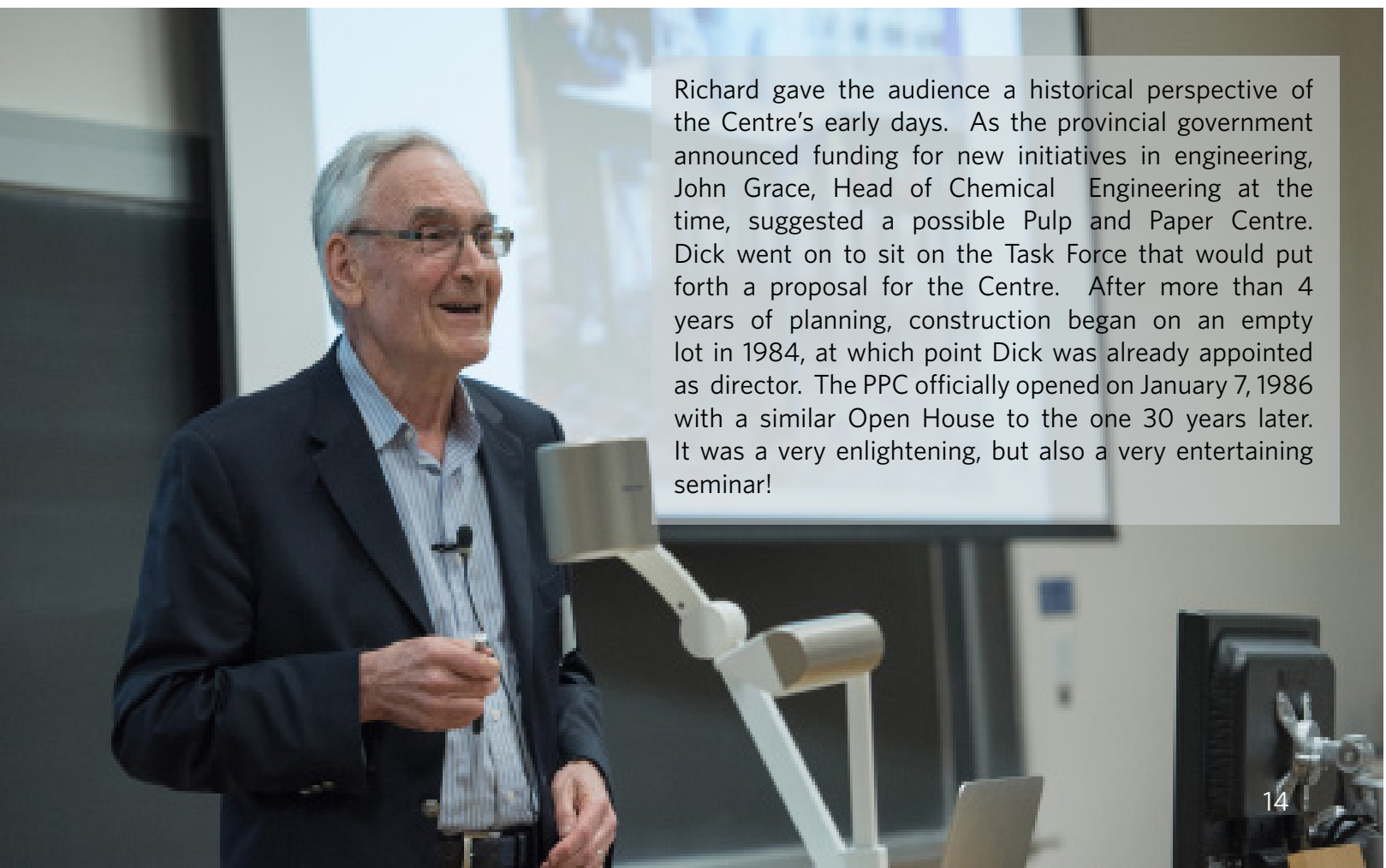
The PPC also organized an Alumni Dinner on May 27 that was attended by 16 guests including alumni, spouses and current faculty. Mark Martinez and Richard Kerekes hosted the dinner that was held at Dockside Restaurant inside the Granville Island Hotel. Guests shared amusing anecdotes and memories during the entertaining evening. We hope you enjoy the next few pages that recap the memorable day.



Mark welcomed guests who included alumni, industry partners and supporters, current students, staff and faculty, as well as several families. The PPC's mandate and teaching initiatives were introduced, followed by a short video presenting the new Master of Engineering Leadership (MEL) in Green Bio-Products professional degree program.

(Above): Mark Martinez, Director of the Pulp and Paper Centre (2013-) and Professor, Chemical and Biological Engineering, UBC.

(Below): Richard Kerekes, Founding PPC Director (1983-2005) and Professor Emeritus, Chemical and Biological Engineering, UBC.



Richard gave the audience a historical perspective of the Centre's early days. As the provincial government announced funding for new initiatives in engineering, John Grace, Head of Chemical Engineering at the time, suggested a possible Pulp and Paper Centre. Dick went on to sit on the Task Force that would put forth a proposal for the Centre. After more than 4 years of planning, construction began on an empty lot in 1984, at which point Dick was already appointed as director. The PPC officially opened on January 7, 1986 with a similar Open House to the one 30 years later. It was a very enlightening, but also a very entertaining seminar!



Heather delivered (again!) her successful Applied Science 2015 *Innovate* talk in PechaKucha style: 20 slides of images for 20 seconds each (6 minutes and 40 seconds in total) to share her passion for Green Bio-Products. This very challenging and unique presentation left the audience impressed.

(Above): Heather Trajano, Assistant Professor, Chemical and Biological Engineering and Faculty Associate at the Centre.

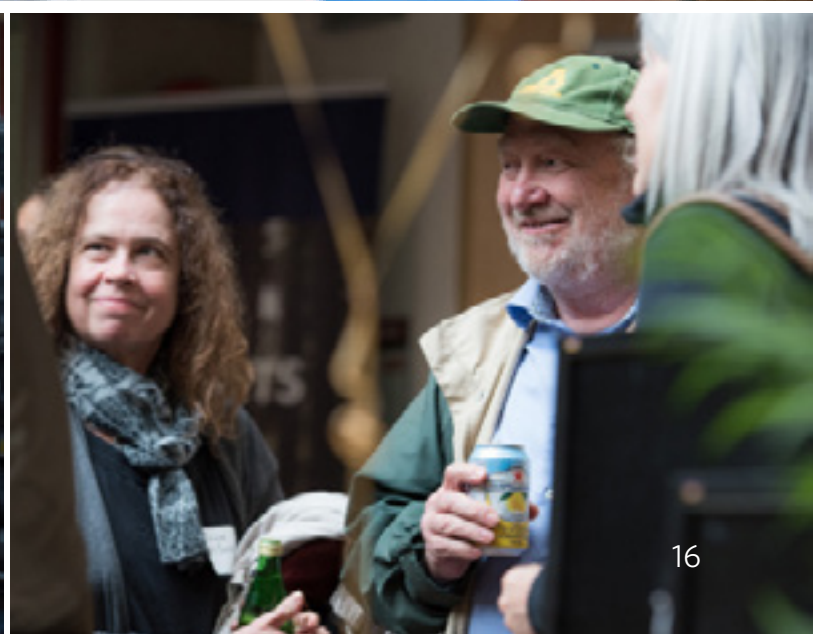
(Below): James Olson, Applied Science Associate Dean and Professor, Mechanical Engineering, and Former PPC Director (2011-2013)

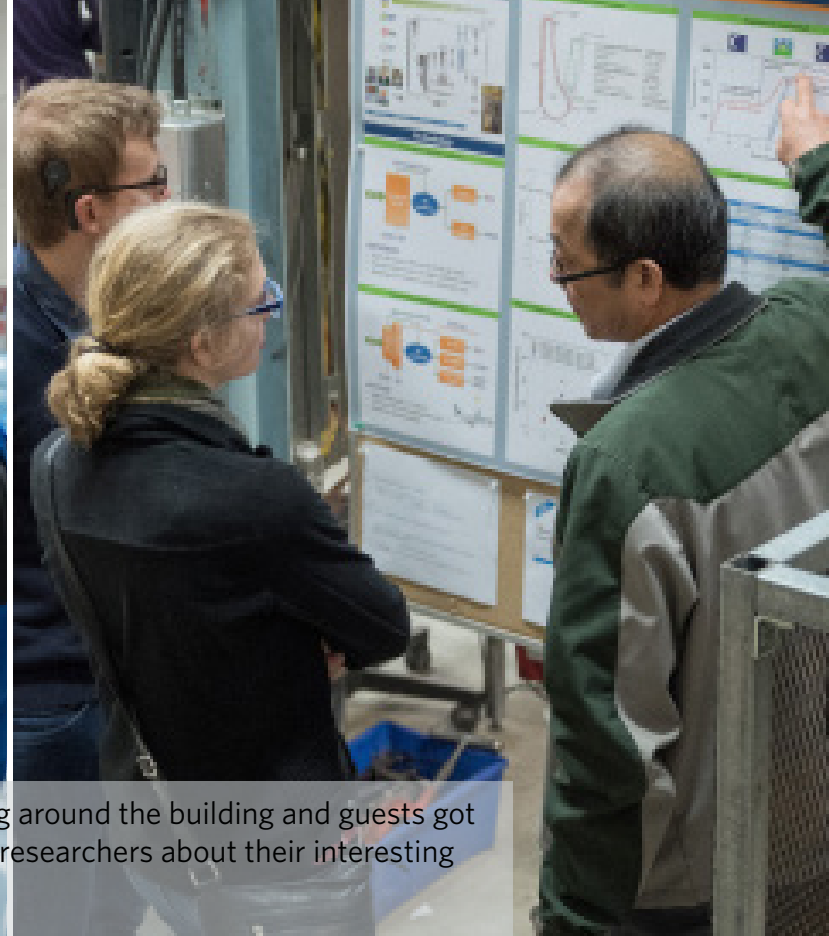
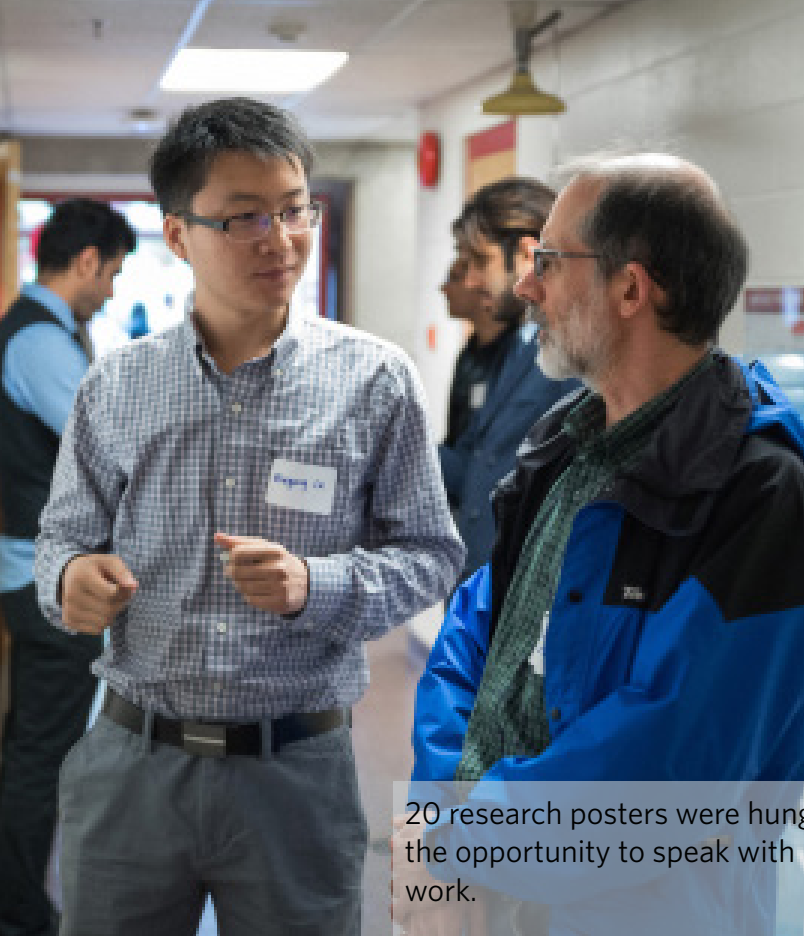


James presented an inspiring talk on the future of pulp and paper research. The PPC, in the heart of this province, is well positioned to lead the global society into a carbon neutral future. James reminded us that the PPC has a long history of innovation, but now has the potential to be exceptional around Industrial Biotechnology and Genomics. The overall message was that the future is bright and full of opportunity!



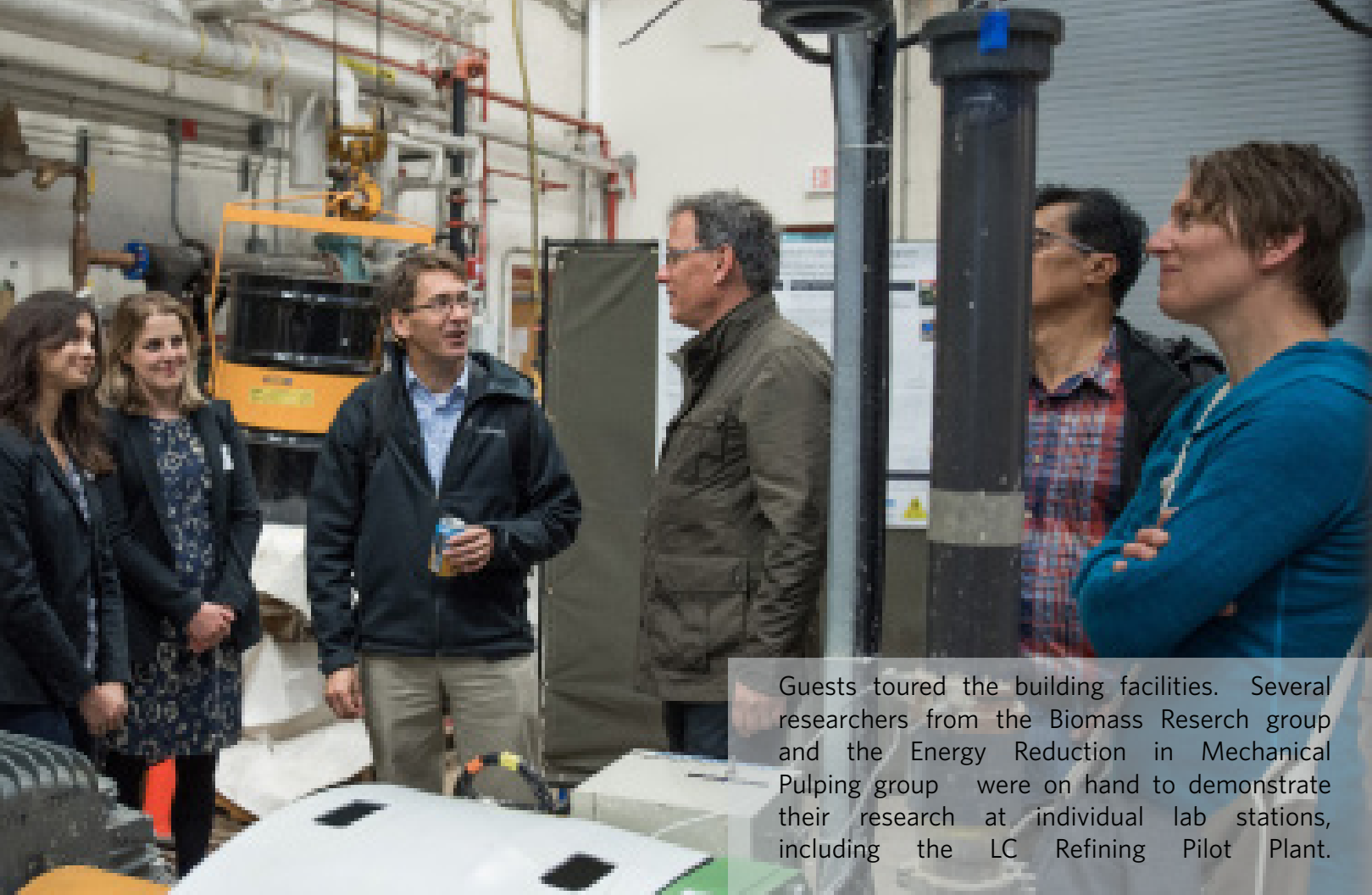
Following the seminars, the large group gathered in the Pulp and Paper Centre reception area for a catered lunch, an opportunity to chat, take photos with the "PPC30" balloons, view historical photos, get some swag and sign a celebratory poster that will be hung in the PPC for many years to come.





20 research posters were hung around the building and guests got the opportunity to speak with researchers about their interesting work.





Guests toured the building facilities. Several researchers from the Biomass Research group and the Energy Reduction in Mechanical Pulping group were on hand to demonstrate their research at individual lab stations, including the LC Refining Pilot Plant.

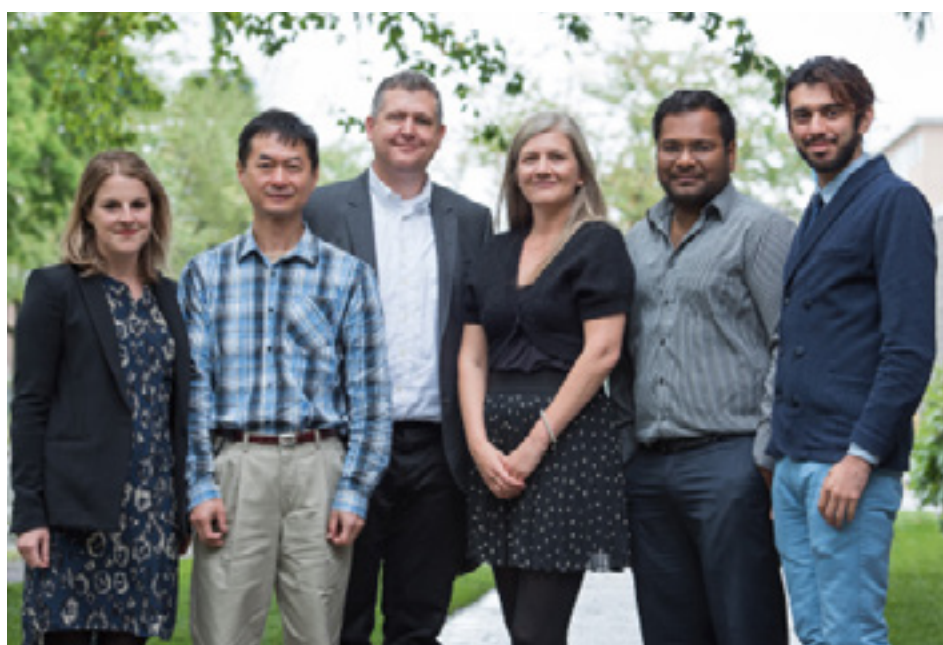




The machine shop was open for tours with David Roberts, Engineering Technician and Machinist, who was on hand for demos and to inform guests of the Technical Courses available to engineering students at the PPC Machine Shop.



The papermaking lab was also up and running. Kids and adults alike had a lot of fun making their own paper.



PPC30 Organizing Committee members: Meaghan Miller, George Soong, Mark Martinez, Anna Jamroz, Sudipta Mitra and Pouyan Jahangiri.

We would like to thank everyone for taking the time to attend the Open House. Our gratitude extends to all students, staff and faculty for their participation and dedication to the Centre.

Videos of all presentations, as well as all photographs, are available for viewing on the PPC website.

Community Outreach



M. Kwick, H. Ahmadi, K. Pan
Not pictured: H. Tian, J. Chen, Z. Yuan



Jingqian Chen received a Best Student Paper Award

PacWest Conference

The PacWest Technical Conference symbolizes the interdependence of those who develop technology in the pulp and paper industry and the many suppliers of related materials and equipment. It provides an opportunity to network with peers, industry leaders and technical experts while enhancing professional development. The 2016 conference theme was "Embracing Technology".

For the third consecutive year, the Pulp and Paper Centre coordinated a successful UBC Student Session to showcase innovative research relating to the forestry and bio-economy industry. Six of UBC's brightest presented their technical papers and presentations to a large audience on June 10, 2016. The presenters were co-supervised by API faculty. The presenters* were:

- Hoda Ahmadi*, James Olson and Mark Martinez. "Novel Production of Cellulose-Mycelia Foam Biocomposite".
- Mathias Kwick* and Mark Martinez. "Absorption and out-of plane swelling in paper".
- Jingqian Chen*, Heather Trajano and Rodger Beatson. "Optimization and Modeling of Hemicellulose Oligomers Production from Pulp Mill Residues for use as Pulp Strength Additives".
- Zhaoyang Yuan*, Mark Martinez and Rodger Beatson. "Effect of alkaline pre-extraction of silica and hemicelluloses on the kraft pulping of bamboo".
- Hui Tian* and Bhushan Gopaluni. "Multiobjective Economic Model Predictive Control and Its Application in the Mechanical Pulping Process".
- Kui Pan* and Sheldon Green. "Mechanics of Creping in Tissue Making".

The students and researchers used this platform to demonstrate how their research and vision has the potential to make lasting changes and advance these strategically important industries. Jingqian Chen was awarded the Best Student Paper at the Conference.

API faculty James A. Olson was also part of the "Embracing Technology" Conference Forum panel.

Community Outreach

Prof. Mark Martinez delivered a lecture on Papermaking.



Students tested freeness in the lab.

Introduction to Pulp and Paper Technology - API Course

The API sponsored another successful course on “Introduction to Pulp and Paper Technology” delivered on April 13-15, 2016. 22 registrants from Paper Excellence, Wescan, Domtar, Hinton Pulp, Andritz Ltd. and AFT, among others, attended the hands-on course. Consisting of lectures in the mornings followed by lab exercises in the afternoons, the course is structured to re-emphasize material properties and enhance understanding of the processes.

The three-day course offered an LC refining component. Students received a refining lecture describing the principles of LC refiner operation and plate design, as well as an overview of the pilot plant setup and operation. A refining demonstration followed the lecture, during which kraft pulp was refined and pulp samples were collected for later testing.

Units of the course were taught by API faculty, along with Robert Gooding, VP Technology at Aikawa Fiber Technologies, and PPC research staff George Soong, Meaghan Miller and Emilia Jahangiri.

Seminars

Over the last year, API organized various seminars at the Pulp and Paper Centre, open to students, faculty and industry guests. Distinguished guests included:

- Antti Oksanen, VTT Technical Research Centre of Finland
“ExtBioNet, Tailored Fibre-Fibre Interactions for Boosted Extensibility of Bio-Based Fibre Networks”
- Angeles Blanco and Carlos Negro, Chemical Engineering Dept. at Univeristy Complutense, Madrid
Seminar 1/2: “Integral Sustainable Water Management in the Paper Industry: A Case Study”
Seminar 2/2: “Wet-End Optimization”
- Fredrik Lundell, KTH Royal Institute of Technology, Sweden
“Fibers and Fibrils in Extension and Shear: From Fundamental Fluid Physics to Material Properties”.
- Christer Sandberg, Holmen Paper, Sweden
“Process Intensification in Mechanical Pulping”

Community Outreach

Ronald McDonald House British Columbia

The Ronald McDonald House BC, located in Vancouver, invited Pulp and Paper staff and researchers to conduct a monthly interactive workshop on papermaking for kids. It is a great opportunity to get out of the lab and spread some cheer to those who need it most. Workshops began in November 2016 and are hosted on the first Thursday of every month. More than 15 volunteers from the PPC, including staff from Engineering Co-op, have enthusiastically begun making monthly rounds to RMH. In December, volunteers hosted a holiday themed workshop — all had a grand time.



Photo above courtesy of Ronald McDonald House BC.



Holiday themed workshop.

We recently spoke to Johanka Macekova, Programs Coordinator at the Ronald McDonald House BC about the impact volunteer programs have.

Q: Tell us a little bit about Ronald McDonald House and what it does.

A: For over thirty years, Ronald McDonald House BC and Yukon (RMH BC) has been providing accommodation for seriously ill children and their families when they must travel to Vancouver for their child's medical treatment. Our new House, which opened on July 7, 2014, serves 2,000 families each year. With a larger House came expanded services for children and families including a fitness room, arts and crafts studio, magic room, LEGO lounge, and several comfortable indoor and outdoor lounges which encourage guests to come together.

Q: Why do you think volunteer programs are important?

A: Volunteer programs enhance the experience of families staying at the house while they're going through a challenging time. Thanks to individuals and organizations donating their time we are able to provide a much greater variety of programs and activities. As a charity we don't have a program budget and if it weren't for volunteers, our programs opportunities would be very limited.

Q: What kind of impact does PPC's papermaking session have on children?

A: Children and their parents can take a break from their stressful day and focus instead on this creative activity. The support and guidance from the UBC volunteers make it possible for kids of all ages and physical abilities to participate. It also creates an opportunity for more shy kids to enjoy this activity as it doesn't require group work and people can work on their individual papers. Further, it allows for learning on how paper is made and where it comes from. In that it has a certain environment awareness and science aspect. It combines science and art in a unique way. The really nice part about this program is that kids walk away with a finished piece which gives them a sense of accomplishment.

Finances

The XIX financial statement for the reporting period is presented below.

1 April 2016 – 31 March 2017	
2016–2017 Budget	\$297,948.00
Opening Balance (from 2015–2016)	-\$2,394.90
Available Budget 2016–2017	\$295,553.10
TEACHING	
CHBE, MECH, BCIT and API Faculty Appointments	\$204,693.06
	\$204,693.06
RESEARCH and PROFESSIONAL	
Professional fees	\$69,766.40
	\$69,766.40
COMMUNITY OUTREACH	
Field trips	\$2,788.96
Conferences	\$1,521.24
API Course and meetings	\$4,834.06
Miscellaneous Charges	\$558.11
	\$9,702.37
OFFICE EXPENSES	-\$830.81
	-\$830.81
TECHNICAL EXPENSES	\$226.85
	\$226.85
TOTAL EXPENDITURES (2016–2017)	\$283,557.87
Uncommitted Balance (2017–2018)	\$11,995.23

What's Next

The API Advisory Group will meet late summer this year. The mandate of the Advisory Group is to advise the University regarding the program, its purposes and funds. The Advisory Group comprises up to ten individuals representing stakeholders from the provinces as well as representatives from the UBC. Members will normally be appointed for three-year terms.

The “Introduction to Pulp and Paper Technology” course will be offered on April 26–28, 2017.

We continue to keep our students attuned to networking with industry through our Industry Night seminars. Dr. Trevor R. Stuthridge, Vice President of FPInnovations was our guest speaker on April 10. His tips brought in practical aspects of strengthening alliances and networks in “Geek to governance: Leveraging strategic serendipity in your innovation career”.

In its fourth successive year, the UBC Student Session will have a strong presence at the 2017 PacWest Conference in Whistler, British Columbia. Six UBC students and researchers — Amir Forughi, Ehsan Zaman, Liyang Liu, Sudipta Mitra, Varun Rangu and Zhaoyang Yuan — will present their research. Dr. Heather Trajano will chair this session.

A pre-conference session at PacWest on June 7 will see a full-day Steering Committee meeting for the Energy Reduction in Mechanical Pulping research group which will consist of principal investigator presentations and a roundtable discussion. Dr. James Olson will deliver the keynote and closing address at this event.