branch lines

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Wood Science at UBC

This edition of Branch Lines highlights some key research activities underway in the Department of Wood Science at UBC. The following articles feature the work of eight of the Department's seventeen faculty members, their graduate students and research staff. The breadth of this research covers the full spectrum of wood science from forest based biorefining (p. 10), binding of wood particles in panel products (p. 8) to particle board quality (p. 11) to drying of baby squares for the Japanese market (p. 9). It also addresses life cycle assessments of windows (p. 4), the performance of wood buildings during earthquakes (p. 2) and the competitiveness of value-added products (p. 6).

This introductory article complements these research summaries by highlighting some recent activities in our Department of Wood Science and Centre for Advanced Wood Processing (CAWP).

New Chair announced

In February the British Columbia government announced a contribution of $1.4 million towards a Chair in Wood Building Design and Construction at the University of British Columbia. The announcement was made during Forests and Range Minister Rich Coleman's tour of the UBC Centre for Advanced Wood Processing and the Chair will be a joint appointment within UBC's Departments of Wood Science and Architecture.

The government's priority in allocating this funding is to make the most out of mountain pine beetle wood in the short and long term by supporting research and

Modeling the seismic response of timber structures

Many people live in earthquake-prone areas where their lives, homes and belongings are vulnerable to seismic hazards. In 1994 the Northridge earthquake NW of Los Angeles resulted in 51 deaths, 22,000 people left homeless and over US$10 billion worth of structural and non-structural damage. In 1995 the most devastating earthquake to hit Japan struck the Kobe area killing more than 5,500 and causing an estimated US$20 billion worth of damage. Despite the high level of destruction associated with earthquakes, well constructed buildings made of wood perform relatively well under seismic forces. This is due to the high strength to weight ratio of timber, the system redundancy and the ductility of connections. However, the structural integrity of wood buildings under the action of natural hazards is not always guaranteed.

Improving the performance of timber buildings in earthquakes requires an understanding of how to quantify their performance. This is a non-trivial task. Firstly because the evaluation of structural performance of buildings against known forces is difficult and requires expensive experimental studies and/or sophisticated computer models (verified against test data); and secondly because the input forces are random in nature, their duration, magnitude and frequency strongly influence the response of the building.

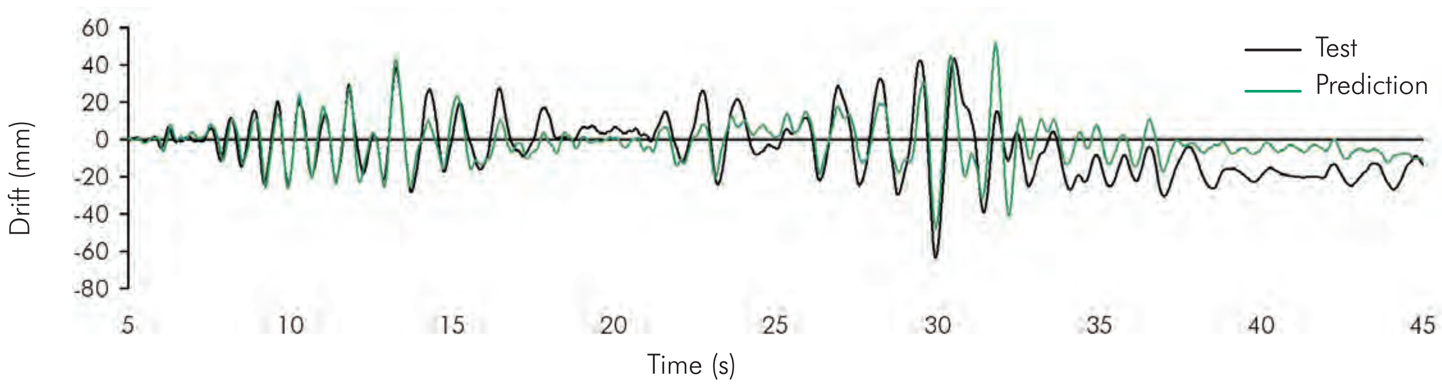
In this study a UBC team developed a mechanistic-based (Pseudo-Nail) model to represent shear wall elements in buildings to carry reverse cyclic loading from earthquakes. The Pseudo-Nail analog consists of a deformable member supported by embedment springs along its length. The finite element method was used to obtain the load deformation information of the analog. The embedment springs were highly non-linear and their parameters were established during model calibration against push over test results of a variety of shear wall elements including wood-frame and post and beam walls. The different types of shear walls considered are listed in the table below.

The calibrated Pseudo-Nail model was used to generate load-deformation curves subject to reverse cyclic loading. This information was compared with test data to verify the model. In all cases studied, good agreement was obtained showing the robustness of the model. Satisfied that the model could predict the load-deformation behaviour of shear walls under reverse-cyclic loading, the model was then tested against ground motion input in a dynamic mode. The figure opposite shows the excellent agreement between the test and predicted responses.

Confident that the model could be used to predict wall elements, we then decided to look at more complicated structures. We constructed a full size 3.66 m x 5.49 m one story Japanese post and beam structure and tested it on the uni-degree of freedom shake table housed in UBC's Earthquake Engineering Research Facility (photo above).

The building was shaken with the Kobe JMA station N-S component (modified version) with a peak ground acceleration of 0.83g. Comparisons of model predictions and measured results indicated good agreement (figure above).

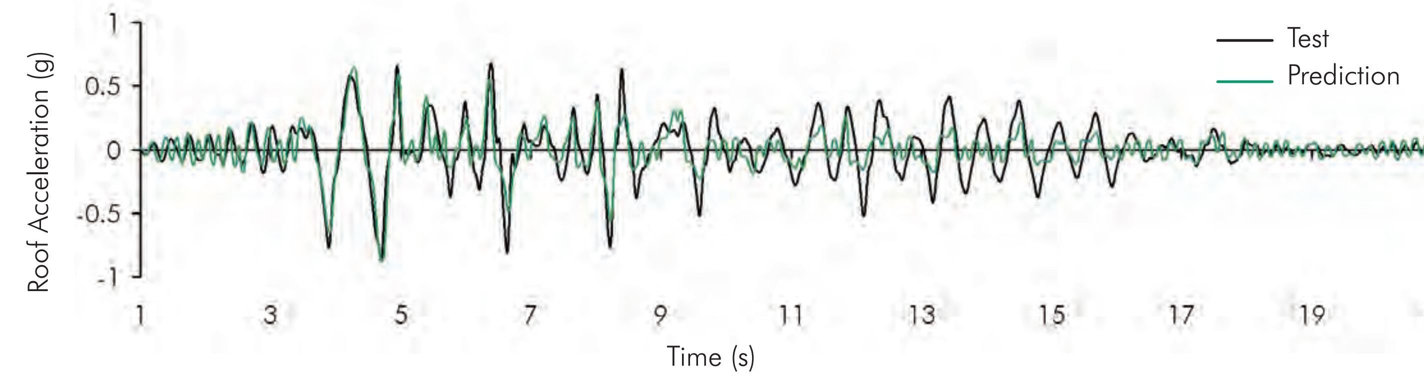
This work supports the use of the Pseudo-Nail model as a robust tool that can be used to quantify the seismic performance of different timber building systems. For further information contact Dr. Frank Lam at 604-822-6526 or frank.lam@ubc.ca.



Comparison of shear wall response under earthquake load

Types of validated shear wall

Structural type	Size	Frame	Panel
Panel sheathed wall	2.4m x 2.4m	Canadian hem-fir	1.2m x 2.4m OSB
Panel sheathed wall	2.4m x 2.4m	Canadian hem-fir	2.4m x 2.4m OSB
Panel sheathed wall	1.8m x 2.7m	Canadian hem-fir	0.9m x 2.6m OSB
Panel sheathed wall	1.8m x 2.7m	Canadian hem-fir	0.9m x 2.6m plywood
Panel sheathed wall	1.8m x 2.7m	Japan sugi	0.9m x 2.6m OSB
Panel sheathed wall	1.8m x 2.7m	Japan sugi	0.9m x 2.6m plywood
Panel sheathed wall	1.8m x 2.7m	European white wood	0.9m x 2.6m plywood
2-braced wall	1.8m x 2.7m	Canadian hem-fir	-
2-braced wall	1.8m x 2.7m	Japan sugi	-
2-braced wall	1.8m x 2.7m	European white wood	-



Comparison of Japanese house response under earthquake load

Full-sized post and beam structure at UBC's Earthquake Engineering Research Facility

Life cycle assessment of windows

Construction and demolition are responsible for nearly 60 percent of the non-industrial waste generated every year in the United States. Recognition of this fact has caused increased attention to the design and selection of materials used in the construction of residential and commercial buildings. Marketing departments of competing building products often highlight their products' environmental favorability and play on emotion-based perceptions while conveniently ignoring the resource use and impacts related to the entire life cycle of the product. Life cycle assessment (LCA) is the methodology used by the scientific community for calculating material and energy use and the resulting environmental impacts in all life stages of a product. LCA provides the appropriate information for green building decision making.

The selection of a window system as part of a green building is made difficult by recent design innovations, the number of materials involved and the multiple functions of a window. Previous LCA assessments on windows have shown wood frames to be less energy intensive and to emit fewer toxic materials than those made of PVC. However, wood frames require more maintenance than those made of PVC. Recently, aluminum clad windows were introduced to the market in an effort to reduce the maintenance required in wood. Fiberglass pultrusions (glass and resin mats cured with heat and pressure) have also been introduced as a frame material and are expected to gain market share in coming years. To date, no LCA has been conducted on fiberglass frame windows or on any contemporary designs specific to the North American marketplace. However, Dr. Taranah Sowlati of UBC's Department of Wood Science has recently been awarded research funds from the Natural Resources Canada Value to Wood Scheme to study a life cycle assessment on aluminum clad timber, fiberglass, and PVC framed windows that represent the most commonly used windows in North American residential construction. In completing the LCA, the resource use, energy consumption, and resulting environmental impacts will be determined for the three window types. This research will identify areas across the product life cycle where each window type has comparative advantage over competing products.

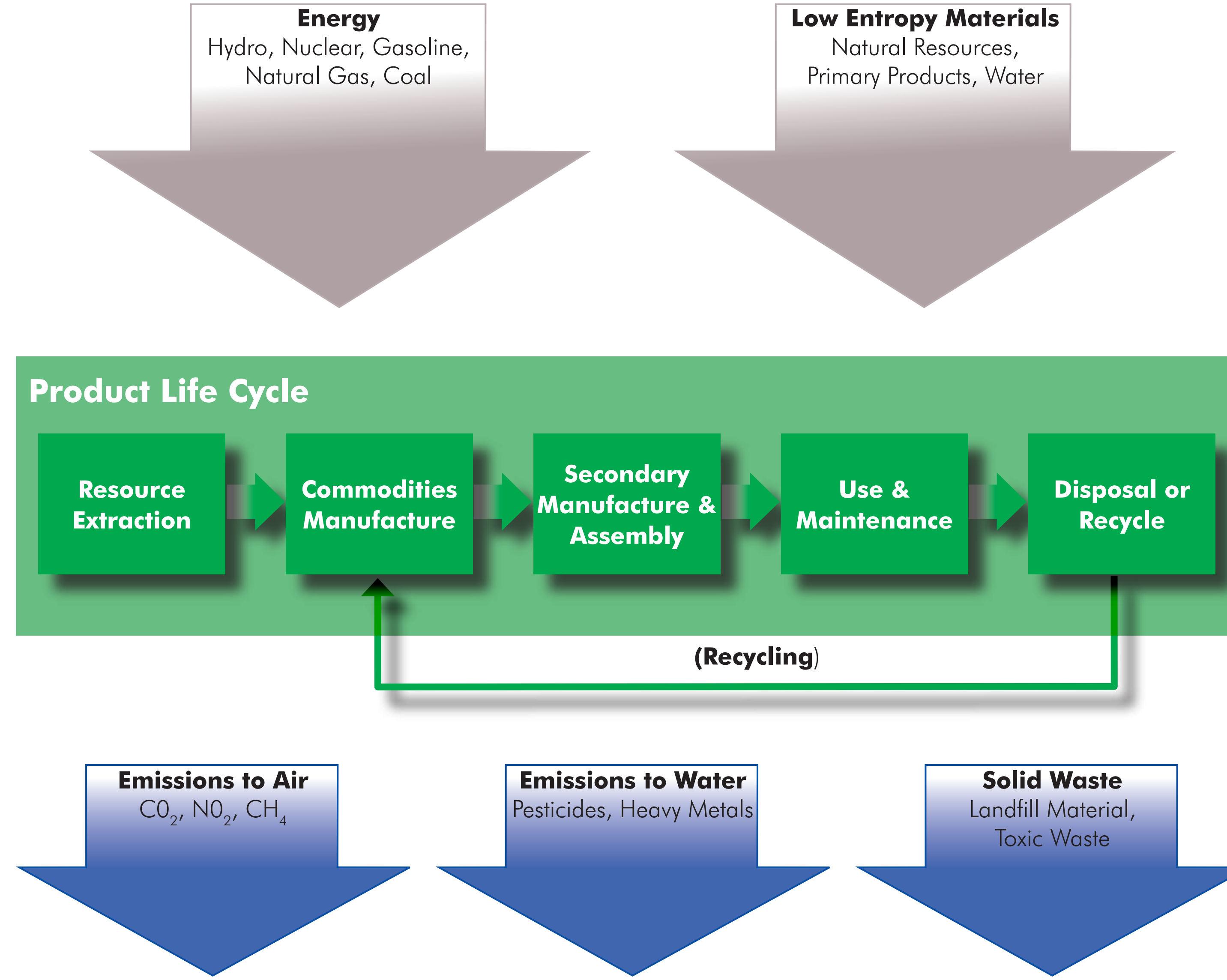
Data for this study were collected from three different window manufacturing facilities:

- Al Clad Wood: Loewen Steinbach, MB
- PVC: Euroline Windows Delta, BC
- Fiberglass: Inline Fiberglass Toronto, ON

Resource use and emissions were calculated for each component of a finished window at each of the facilities:

- Frame: Wood & Al, PVC, Fiberglass
- Glazing: Glass & LowE coating
- Spacer: Aluminum, Foam
- Inert Fill: Argon
- Hardware: Steel
- Solvent Based Preservatives, Paint, and Stains

Published secondhand data will be used to complete the life cycle inventory which is the sum of all resource use and emissions for the life cycle of a product. Sima Pro software will be used to model



Life cycle resource use and emissions of a product

the life cycle and to convert the life cycle inventory to the corresponding environmental impacts. Characterization factors in this conversion will then be used to group impacts into categories of societal concern such as climate change, stratospheric ozone depletion, acidification, human toxicological effects, and resource use. The results of this study will facilitate the reduction of environmental impacts by providing better information about window material selection.

For further information on this project contact Dr. Taranah Sowlati at 604-822-6109 or taraneh.sowlati@ubc.ca.

Improved competitiveness in British Columbia's value-added wood sector

The much bandied about term "value-added" refers to adding incremental value to wood products through secondary processing steps. The family of value-added wood products is diverse and includes a wide range of goods typically, although not exclusively, used in appearance applications – furniture, windows, doors, cabinetry, flooring, millwork, and so on. To a lay person, this may seem to be a fairly inconsequential sector. However, the collective value of these sorts of products in a new house, for example, can far outweigh the cost of the structural commodity products (ie, dimension lumber and sheathing) that went into building that house. Just think about how much can be paid for hardwood kitchen cabinets or flooring compared to the structural wood materials used in a house.

In British Columbia, the production of commodity wood products – dimension lumber, panels, and pulp and paper – has long served as one of our most important economic engines. However, due largely to the forces of globalization, these sectors face increasing competition, generally low returns, increased social and environmental accountability, and uncertain futures with respect to fibre availability. One solution that has been put forth to transform a forest industry that is in decline has been to catalyze a more meaningful value-added sector in BC. Most, if not all, forestry stakeholders – industry, organized labour, forest dependent communities, governments, First Nations, environmental groups – have embraced the notion of value-added production as a conservation-based vehicle for change, a means of achieving the tenuous balance between maintaining environmental, economic, and community health. However, despite years of policy initiatives aimed at improving business conditions and fibre supply, the value-added sector in BC has yet to gain any significant traction.

In 2005, Deborah DeLong completed her Master's degree, under the supervision of Drs. David Cohen and Robert Kozak, on the competitive factors that can contribute to the success of the Canadian value-added sector. Recently, as part of the BC Forum on Forest Economics & Policy's Value Focused Forestry initiative, we were asked to drill down on these survey results and provide information on how to grow the BC value-added sector.

Four areas were recognized by BC value-added wood producers that could substantially contribute to improved competitiveness and sector growth: access to suitable raw materials; improved workforce training; enhanced operational efficiencies; and an increased customer (market) focus.

Access to Suitable Raw Materials

A consistent theme is the inability to access suitable raw materials in BC. From log house builders requiring specific log sizes, to the producers of finished building products requiring custom dried cut stock, value-added producers have difficulty accessing suitable raw materials at globally competitive prices in BC. It is important to ensure that this sector is well represented at discussions regarding changes to tenure, forest harvesting policies, and First Nation's forestry agreements so that their concerns are incorporated into changing forest policies. As small and medium sized enterprises, their voices are often neglected despite the significant economic and social contribution that they make, particularly in rural communities.

Improved Workforce Training

This includes both skilled craftspeople and management. To improve management training, short courses, diploma programs, and even business apprenticeship training could be considered. To ensure the best uses of educational resources, it is important to capitalize on existing opportunities along with linkages to national programs. It is important to separate skills needed by all sectors (eg, management skills) and those unique to specific sectors. We recommend that a problem analysis of the current training streams for wood workers across BC be completed with a broad range of industry representatives.

Enhanced Operational Efficiencies

All firms, regardless of sector, require continued improvements in operational efficiencies. As offshore competition increases in both Canada and the US, operational efficiency and productivity must also improve. Programs that provide technological solutions on site need to be maintained and expanded to include emergent business concepts like supply chain management, internet marketing, and mass customization.

An Increased Customer (Market) Focus

While firms recognize the importance of increased customer service, as well as the need to identify and serve market niches better than their competitors do, they have little understanding of the market research necessary to improve in these areas. Systems need to be developed that ensure that the flow of products from companies to markets is matched by an equal flow back of information on customers, changing product requirements, and competitive shifts. Short courses could be developed that focus on customer research techniques to ensure continued success in targeted market segments. As more and more value-added wood products add service components to their product offerings (eg, installation, design, technology, knowledge), it becomes increasingly important for companies to incorporate a strong customer focus.

The value-added wood products sector in BC has the potential to be a dynamic and innovative part of the wood products industry. Due to the difficulties of the much larger and more concentrated commodity wood products sector, value-added production has not garnered much attention recently. Whatever the reasons for this, the time has come to recognize that the development of a truly sustainable wood manufacturing industry in BC MUST include a viable, healthy, and growing value-added sector.

For more information, please contact Dr. Robert Kozak at 604-822-2402 (rob.kozak@ubc.ca) or Dr. David Cohen at 604-822-6716 (david.cohen@ubc.ca).

Picking the glue from the wood

Distinguishing resin in wood composites

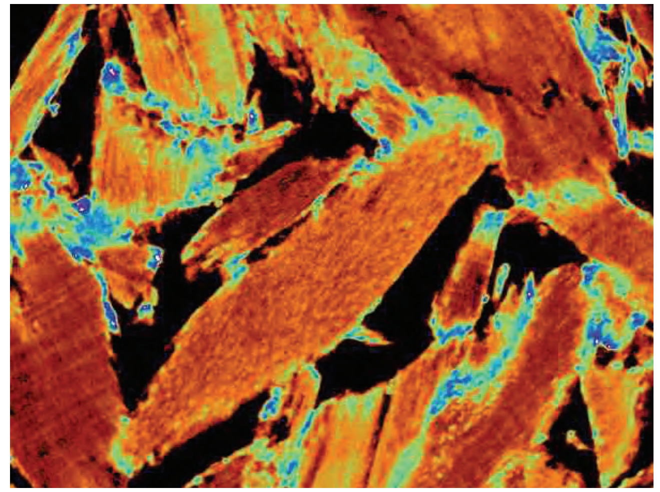
Wood composites are mixes of wood particles glued together with resin. While only constituting 4-6% of the final product, resin makes up around 20 to 30% of its total cost making it the most expensive component of a composite board.

Wood composites are big business and the production of oriented strand board in North America, which is only one of a suite of composite wood panels, will exceed 26.73 billion ft^2 this year, according to the American Engineered Wood Composites Association. Surprisingly, given the expense of the resin, we don't know a lot about where the glue goes and how it binds together wood particles in panels. We know it works but we haven't got a good model for why it works so well. Without this understanding, it's difficult to improve the process and explore techniques for reducing the amount of resin being used.

Traditional forms of analysis have involved taking multiple thin sections of the finished board and the use of microscopic techniques to visualise where the resin is located. Besides being time consuming and labour-intensive, it's difficult to capture the three dimensional nature of the particle/resin matrix using this technique. Could X-ray tomography be a more effective technique for understanding this system?

X-ray CT (CT stands for computed tomography) is a process in which an object is scanned with X-rays to create a 3D image of the object. Medical CT does this by taking thin slices through the object. Another approach is to take radiographs of the sample from different angles, which are then reconstructed to form a tomogram (a 3D density map of the sample). This can be viewed from different angles,

Graduate student Olivia Morrison picking out the wood from the glue using micro-computerised tomography



Computer generated image from micro CT data of a composite wood panel; wood is red; resin is blue-green and void space is black

and at different depths through the sample.

It's this second approach that has been used by Professor Philip Evans at the Centre for Advanced Wood Processing (CAWP) in collaboration with colleagues in the Department of Applied Mathematics at The Australian National University (ANU). Professor Evans and a student, Olivia Morrison, set out to use The ANU's advanced X-ray CT facilities to quantify the distribution of resin in particleboard. It turned out to be a difficult nut to crack.

Can't see the resin

Olivia set about scanning samples of commercial particle board, but a major obstacle was immediately thrown in her path. The X-rays could not distinguish the wood particles from the urea formaldehyde resin that bound them together. There were two potential solutions that warranted further investigation. One was to increase the opacity of the wood particles to X-rays. The other was to increase the opacity of the resin to X-rays. The wood particles could be made more opaque if they were labeled with potassium bromide. The urea formaldehyde resin might be made more opaque to X-rays if it had copper sulphate mixed in with it. Olivia chose the latter option and produced boards with copper sulphate labelled resin. The resin could now be clearly distinguished from the surrounding wood particles. Using this imaging technique the team at CAWP and the ANU were able to gain new insights into the interaction of resin and wood in composite panels that promise to revolutionise our studies of wood/resin systems.

And what were the first results of this process? It seems that when the wood particles are squashed together under pressure the resin clumps together where the chips are touching. The resin does not form a uniform thin layer over the entire wood particle (see image opposite). This has implications for how other ingredients in the composite mix such as wax and hardener are behaving. What it all adds up to is the topic of a whole new research program that Professor Evans and colleagues at the ANU (Professors Mark Knackstedt, Tim Senden and Ray Roberts) hope to follow up on in the coming years. (A more comprehensive version of this article first appeared in ANU's Materials Monthly, produced and edited by Mr. David Salt).

For further information contact Dr. Phil Evans at 604-822-0517 or email phil.evans@ubc.ca

Pith location affects hem-fir drying

Large volumes of relatively small-diameter logs can be generated from sustainable sources such as our Pacific Coast Hemlock (PCH) second-growth forests. However, the proportion of juvenile wood in this kind of material is much higher than that found in any old growth forests. This juvenile wood has proved more difficult to dry than mature wood and can create unpredictable problems in the kiln drying process. The target market for PCH baby squares (105mm squares) is the traditional Japanese post and beam wood frame housing industry. As such, this market is extremely important to the forest industry of British Columbia.

Taking in to account that target customers in Japan demand high quality timbers for their construction needs, UBC's Stavros Avramidis and his graduate student Slobodan Bradic have been investigating the impacts of juvenile wood presence, target moisture content and season of cutting on the reliability of drying quality in PCH baby squares. Their study valuated the drying quality of 105mm square timbers (baby-squares) from second-growth western hemlock (*Tsuga heterophylla*) and Amabilis fir (*Abies amabilis*), commercially known as PCH (or hem-fir). Their study looked at the influence of juvenile wood presence (shown by pith location at the end-surface), target moisture content (15% vs. 20%) in drying and the season of cutting of the timber.

Initial results have revealed that timbers with the pith shown in the centre should be avoided in the production of PCH baby-squares due to their high affinity for bow, twist and surface checks. This variable shrinkage appeared to be related to the coupling of juvenile and mature wood within specimens. Timbers with the pith shown close to one of the sides in cross-section had lowered, but acceptable drying quality according to the E120 CFLA grading rules.

A target moisture content of 15% exhibited a greater risk for twist and surface checks, than drying to a 20% moisture content.

The importance of the cutting season was reflected through its significant interactions with the target moisture content in the case of volumetric shrinkage, and with the pith location in the case of twist. These were the consequences of lower initial moisture content in summer-cut green specimens that occasionally reached a moisture content below the fiber saturation point and had started to shrink before kiln drying.

Recognizing the importance of the PCH baby square market to our forest industry, Dr. Avramidis advocates that we should implement these conclusions through a comprehensive pre-sorting system prior to kiln drying. Such a system could be designed by implementing a visual scanning system of the timbers in the green-chain where end-surface digital pictures could be analyzed and the annual ring pattern and pith location revealed and estimated. This way timbers could be classified as to their potential drying "performance" prior to the kiln drying process.

For further information contact Dr. Stavros Avramidis at 604-822-6153 or stavros.avramidis@ubc.ca

Pith location in hem-fir baby square test samples

Forest-based biorefining at UBC

A biorefinery is a facility that can turn biomass into multiple products, including energy, transportation fuels, industrial chemicals, and materials. Like a petroleum refinery, the economics of the process are driven by producing a combination of high-value, low-volume niche products with lower-value, high volume commodities. A number of research groups around the world – including the Forest Products Biotechnology group at UBC – are developing wood-based biorefineries that have the potential to revolutionize the Canadian forest industry.

It is an industry that needs revolution! Increasing competition from tropical regions of the world must be met with an ageing infrastructure, an expensive workforce, and a slow-growing forest resource. While lumber and solid wood products have held their value, traditional residue-based commodities like Kraft pulp have trended downwards over the long term. Even our forests are working against us - the ongoing Mountain Pine Beetle outbreak in BC is an example of threat that a warming climate brings. To rejuvenate itself, the forest industry requires new products and markets, which can be achieved through biorefining.

The wood-based biorefinery will take many of its design cues from existing starch-based biorefineries found throughout the world today. These facilities primarily use corn or wheat grains to generate ethanol, a renewable transportation fuel. They also produce a number of co-products including livestock feed, nutraceuticals, and functional food products. Major research projects in the United States and in Europe are currently focused on commercializing innovative chemical co-products from the starch-based biorefinery, including bioplastics and other bulk polymers. By nature, starch is a storage molecule composed of a single sugar - glucose. By comparison, wood contains six or seven individual sugars (cellulose and hemicellulose), as well as other chemicals (lignin and extractives). Moving from starch to wood thus poses a significant challenge.

Recent technical improvements have made biorefining technologies to process wood more technically and economically feasible. The Forest Products Biotechnology group has spent years developing better ways to get sugars out of wood (through enzymatic hydrolysis); one interesting discovery along the way is a method to separate lignin from the wood matrix. We are also examining ways of applying the lessons learned in starch-based biorefineries to create new chemical products from the wood-based biorefinery, including bioethanol, lactic acid and polylactide, propanediol, and succinic acid; these chemicals can be used as fuels, to create consumer products such as bioplastics, or as platform chemicals in a number of industrial applications.

What will a wood-based biorefinery look like? There are a number of options. We may retrofit existing pulp mills, adding new process stages to liberate wood chemicals or to more efficiently generate heat and power. We may focus on expanding modern sawmills - adding new processing facilities on these sites would allow us to utilize mill residues without a transportation cost. Or, we may create new 'green field' facilities that will be purpose-built for bioconversion. Much will depend upon economies of scale; some technologies that we are examining work well at smaller scales, while others require significantly larger facilities.

The wood-based biorefinery has the potential to generate value-added bioproducts as well as fuel and energy for the forest sector. Our group is taking a leadership role in developing the technology required for to make this happen, and we are working closely with policymakers and planners to ensure that the biorefining option is considered as the forest industry responds to changing markets and climate. Our vision is a forest industry that supplies consumers with renewable, sustainable chemicals, materials, and fuels for the 21st century. A tremendous opportunity exists for the Department of Wood Science to house a UBC Centre for Biorefining, one that would capitalize on the strengths of our faculty and provide a national forum for research and development.

For more information contact Dr. Warren Mabee at 604-822- 2434 (warren.mabee@ubc.ca) or Dr. Jack Saddler at 604-822-3542 (jack.saddler@ubc.ca).

Improving particleboard quality

The wood composite panel industry in North America (particularly particleboard and medium density fiberboard or MDF) faces fierce competition from Asia where the same products are manufactured at a fraction of the cost of production here. This has been exacerbated in recent years by rising costs of wood and resin, and has lead to the closure of three Canadian plants with another to follow in April. The squeeze is being felt not only by panel manufacturers but also by Canadian companies that use particleboard and MDF to fabricate ready-to-assemble (RTA) furniture. There is pressure on particleboard manufacturers to reduce production costs by reducing wood and resin quantity, but this can compromise product quality if not executed smartly. The ability of the edges of boards to hold fastening screws and resist delamination are important features of particleboard used in RTA furniture, and are strongly influenced by bond strength.

Furniture grade particleboard is most commonly bonded together using urea formaldehyde resin. Mats are compiled from resinated particles in three layers (coarse particles in the core and fine particles on the surfaces) and pressed for a few minutes at approximately 160°C. The particle size, shape, surface roughness and moisture content, the resin formulation and age, amount and distribution of resin on particles after blending, and the pressing conditions (temperature, densification) all interact to affect final bond strength. The performance of RTA furniture built from particleboard is strongly affected by bond strength between particles. A shelf can delaminate at the site of the screw fixings in its edge as loading transferred through the fastener pries the internal layers apart. Research over the last couple of years in the wood composites group at UBC, principally by Dr. Kate Semple and Mr. Emmanuel Sackey, has identified marked variation in the strength and bonding properties of different Canadian made particleboards; and contrary to convention, higher density boards are not necessarily higher in bond strength and screw holding capacity. There is little information in the public domain enabling furniture designers and manufacturers to directly compare the performance of fastenings in particleboard. Research last year also focused on comparing the performance of different types of screws in fastening particleboard shelving (as shown in the photographs below), and Canadian manufacturers of RTA furniture have taken a keen interest in the findings.

Another factor which affects the desirability of particleboard for RTA furniture is simply its weight. Particleboard may be compressed to between 30 and 150% of the density of the original parent wood from which the particles were produced. This means that a cabinet or set of drawers made from particleboard can be considerably heavier than one made from solid wood. There is an onus on reducing the density of particleboard while at the same time increasing its bond strength, preferably without increasing resin costs. This means increasing the bonding efficiency of particleboard. There has been relatively little work done on the potential improvements for board properties through the combination of various particle size fractions. Appropriate mixing of these size fractions may enable the resin content and density of the board to be reduced, thus lowering overall board cost and improving properties. Further research is aimed at improving our understanding of the bonding mechanisms in particleboard, focusing on the role of particle size, shape, and distribution through the vertical profile of the board.

For more information, contact Dr. Greg Smith at 604-822-0081 or gregory.smith@ubc.ca.

Photos show the performance of particleboard joints held together with screws: (left) failure at fastening sites and (right) joint strength exceeds bending strength of the board development into new products and markets. The new Chair – the first of its kind in North America – will play a big part in this effort.

Associated with UBC's Timber Building Technology Group, the Chair will also:

- Develop new opportunities and demand for value-added wood components, especially from beetle wood.
- Integrate architecture, engineering and wood products knowledge for the advanced design and construction of timber structures.
- Provide technical advice to B.C.'s forest, construction and architecture communities on the greater use of wood products within existing building codes.

In addition to the $1.4 million from the Province, funding commitments have been received from Ainsworth Lumber, Forintek Canada Corp., Goodfellow Inc., Hundegger USA, Read Jones Christoffersen, SPF Group of Companies, representing Interior B.C. and Alberta producers of spruce, pine and fir dimension lumber, Timber Systems Ltd., and Western Archrib.

Largest undergraduate wood products manufacturing program in North America

Recently, a benchmarking assessment was made of undergraduate wood science and wood products manufacturing programs at North American universities. The results confirmed that the Faculty of Forestry's Wood Products Processing program, which currently has 113 students, has the largest enrolment of any such program in North America. This assessment revealed that we have the largest graduate program in wood science in North America with a current enrolment of 64 students.

International outreach

The international activities of our Wood Science department and CAWP have continued to develop steadily over recent years. Notable achievements include:

- A $1 million CIDA funded project on wood products education for South Africa which is being lead by Dr. Phil Evans, Director of CAWP. During the six-year project, CAWP will develop state of the art distance education material, course curricula and faculty training to facilitate advanced wood processing education at the University of Stellenbosch and Nelson Mandela Metropolitan University.
- Our relationship with Chinese universities continues to be strengthened in an initiative lead by Dr. Frank Lam. Over the past three years, Professors Lam, Foschi, Prion and Barrett from UBC have participated in the teaching of a formal timber engineering course in Tongji University. Professor Lam has also given lectures in Beijing Forestry University, Nanjing Forestry University and Tsinghua University in Beijing. Department members have also participated in technical seminars on timber engineering in Shanghai, Nanjing and Beijing. Faculty members from Tongji, Tsinghua and Beijing forestry universities have visited UBC to upgrade their knowledge of timber engineering. Numerous Chinese graduate students are currently conducting graduate studies in timber engineering at UBC.
- Dr. Rob Kozak continues to contribute to the United Nations Economic Commission for Europe (Timber Committee) Team of Specialists on Forest Products Markets and Marketing. In addition, he has been appointed the Editor of the Journal of Forest Products Business Research published by the Forest Products Society.
- Dr. John Kadla recently returned from Japan where he received a fellowship from the Japan society for the Promotion of Science to research on regiospecifically modified cellulose in the laboratory of wood chemistry at Hokkaido University.
- Faculty have been active in curriculum development with institutions in several different countries including:
    - University of Auckland and Waiariki Institute of Technology (New Zealand) – assisting in the development of a wood processing option in their mechanical engineering undergraduate degree program and continuing education training modules.
    - University of Bio Bio (Chile) – assisting in the development of a wood processing undergraduate engineering cooperative education program.

I welcome your feedback. You can reach me at jack.saddler@ubc.ca or 604-822-3542.

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Newsletter Production

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