THE EDGE

FPInnovations reports on the challenges of implementing scanner scaling in B.C.

By Jennifer Ellson, FPInnovations

Forest companies are interested in using laser log scanners for scaling logs as it offers the potential of lowering scaling costs while maintaining an accurate scale. However, a number of regulations and operating practices must be examined and possibly changed before log scanners can be used operationally.

FPInnovations has conducted a study on log scaling in British Columbia, with particular emphasis on applying the technology for the coastal forest sector.

A federal government body, Measurement Canada, is responsible for certifying that mechanical measurement devices used for trade in Canada meet recognized standards, but no standard currently exists for log scanners to be tested against. Accordingly, the Canadian Standards Association (CSA) Technical Committee on Scaling of Primary Forest Products is currently developing a standard for log scanning devices, and Measurement Canada will ensure that log scanners meet the CSA standard, with the eventual goal of certifying them for trade.

The B.C. Ministry of Forests, Lands, and Natural Resource Operations formed a Provincial Log Scanning Technical Review Committee to provide a set of recommendations for implementing scanner scaling to the Director of the Timber Pricing Branch.

FPInnovations’ report is intended to provide the committee with background information to help assist its review, analysis, and formulation of recommendations. In the report, FPInnovations recommends that a scanner scaling pilot study be conducted on an accelerated schedule after addressing the issues raised in the report and clarifying the legal requirements for Measurement Canada approval. Such a schedule would likely require that the test be conducted before the scanner receives full Measurement Canada certification. A suggested pilot study outline is included in the report.

For more details about the report, contact Peter Dyson at peter.dyson@fpinnovations.ca or at 604-222-5635.

FPDat: The heavy duty on-board computer

By Jean-Luc Bernier, FPInnovations

In the forest products industry, competition is driven by fibre costs. Delivered wood fibre typically represents between 50 to 60 per cent of production costs at most Canadian softwood sawmills, and between 25 to 40 per cent at pulp and paper mills. Any improvement in the highly capital intensive forest-to-mill value chain is bound to increase the competitiveness of traditional industries while supporting the emerging bioeconomy.
The starting point for any improvement towards more efficient and productive forest operations is the gathering of relevant and accurate data concerning equipment performance and productivity. After all, you can only improve what you can measure.

For logging contractors and equipment operators, the most important challenge is to measure and integrate several parameters at once: productivity information to know real costs; downtime data to improve operations management, reduce operating costs, and implement preventative maintenance strategies; accurate production/performance feedback to forecast future performance and improve budgeting; and accurate inventory management and workflow information to manage cash flow and work schedules.

Currently, there are more than 5,000 pieces of logging equipment operating in Canada, which harvest an annual volume of 120 million cubic metres from the country’s forests, providing more than 30,000 jobs. This sector could benefit from a minimum of $50 million in increased profitability by using optimized solutions.

Over the past several years, FPInnovations researchers from the Forest Operations program have taken great care in designing and building FPDat, an on-board computer that collects and analyzes data directly from heavy machinery. A rugged device built to withstand difficult conditions such as forest, mining and construction operations, FPDat informs operators and managers on various parameters such as utilization, treated areas, GPS track logs, productivity and the causes of downtime.

FPDat is actually the core of FPSuite, a seamless operation monitoring system that aims to reduce harvesting and transportation costs. FPSuite also includes FPCom, the data communication modules, and FPTrak, the web-based data hosting and reporting tool. Data collected by FPDat is transferred to an office via one of the many FPCom technologies, then managed and accessed by users on the FPTrak web portal.

FPDat and the other tools of FPSuite were developed with the financial support of the Transformative Technologies Program (TTP) of the federal government. More than 300 FPDat units are already in use all across Canada and as more specialized modules are being developed, such as the Transport and the Grader modules, more users are getting in line for their share.

**Time management and productivity monitoring**

FPDat is equipped with a touch screen that displays real-time performance indicators. This allows operators to enter important information such as ID and ongoing activities, as well as to instantly quantify the impact of any decision on performance and therefore on profitability.

A motion sensor continuously gathers the necessary data required for calculating the equipment’s level of use in real time. Production downtime can be signalled by the operator using FPDat’s touch screen, allowing the constant review of work procedures and methods in order to increase operational time.

FPDat’s integrated navigation system enables it to determine and display the spatial location of any machine in which it is installed. Customized operating maps can be uploaded and displayed on the screen, as well as the machine’s position in real time in relation to boundaries and other constraints. FPDat’s mapping interface supports ESRI format as well as geo-
FPDat also accepts personalized production parameters. As a result, operators can save information on the work achieved, depending on the type of operation performed. For instance, a forwarder operator can easily enter the quantity and type of product that was unloaded at roadside, making it possible to estimate and locate the total volume transported for each product.

At the end of the day, revenues depend on whether or not the equipment is used to full capacity. FPDat provides this valuable information in real time. The analysis of working hours compared with non-productive hours makes it possible to increase the use of equipment and, consequently, income.

“Conservative estimates of the productivity improvement among user operators range from five to 10 per cent,” said FPInnovations’ Forest Operations Research Leader Martin Castonguay. “This represents on average a savings of $1.20 per cubic metre or at the very least $20,000 of annual savings per machine equipped with FPDat.”

Having clear productivity objectives and real-time results is a source of motivation and success for personnel. As an integral component of a continuous improvement process, FPDat is a tool to help employees work towards successfully reducing costs.

For more information about FPDat or the FPSuite system, visit www.fpsuite.ca or contact Martin Castonguay at 514-782-4515 or at martin.castonguay@fpinnovations.ca

Coming soon: Guide for the design and construction of tall wood buildings

By Jennifer Ellson, FPInnovations

FPInnovations is set to release a technical guide for the design and construction of tall wood buildings in Canada.

The purpose of the technical guide is to support the design and construction of tall wood buildings and facilitate acceptance by authorities having jurisdiction using the alternative solutions path in building codes.

Under the guidance of a working group comprising design consultants and experts from FPInnovations, Natural Resources Canada (NRCan), and the Canadian Wood Council (CWC), more than 60 technical professionals—architects, structural engineers, code consultants, experts from universities, FPInnovations, National Research Council and the CWC—have been involved in the development of this guide.

Tall wood buildings currently fall outside the scope of acceptable solutions in North American building codes and design manuals for wood structures. Design teams of tall wooden buildings will have very specific design, construction, and maintenance challenges that will need to be addressed, and those responsible for the first demonstration buildings will have additional considerations. This technical guide is designed to systematically address those challenges in selected demonstration project(s).

Intended to assist architects, engineers, code consultants, developers and building owners, the guide is not specific to any one structural solution. Rather, it establishes the parameters and resources necessary for a capable team to design...
a tall wood building that meets the performance requirements of current building codes and the competitive building marketplace.

It’s expected that owners, design teams, and authorities will expand on the guide with the specifics appropriate to their projects and that future editions of the guide will add increasing detail as the industry grows and the more efficient systems are developed.

Tall wood buildings have existed for centuries—tall wooden pagodas up to 19 storeys high were built in Japan some 1,400 years ago, and are still standing today in high seismic and wet climate environments. In Canada, in addition to many five to six-storey light wood frame buildings, some notable mass timber buildings have been or are being constructed, such as the five to nine-storey heavy timber buildings in Toronto and Vancouver, as well as the University of British Columbia’s five-storey Earth Sciences Building in Vancouver, B.C.

For more information, contact Erol Karacabeyli at erol.karacabeyli@fpinnovations.ca or at 604-222-5645.

**CWFC seeks partners in innovative biomass production and conversion systems quest**

*By Tony Kryzanowski*

Canadian Wood Fibre Centre (CWFC) staff at the Northern Forestry Centre in Edmonton rolled out the red carpet for their colleagues at the Canadian Forest Service (CFS) in late October with a Field Day aimed at encouraging more “cross pollination” between the two groups on developing innovative biomass production and conversion systems.

Derek Sidders, CWFC Program Manager and Regional Coordinator for the Prairies, says the organization is eager to partner with researchers from the CFS and other organizations because it diversifies and enhances the scope of their research programs and maximizes the benefits to their stakeholders.

CWFC demonstrated just one example of an innovative biomass conversion option at the Field Day with onsite production of biochar from wood fibre, using a mobile pyrolysis unit it accessed through another one of its partners, Alberta Innovates Technology Futures (AITF). The two organizations are working together on the Alberta Biochar Initiative.

The Field Day also featured a tour of CWFC’s first concentrated biomass and high yield afforestation research site south of Edmonton, as well as an introduction to the innovative digital imaging tools CWFC and CFS staff have combined with remote control, unmanned aerial vehicles to gather visual information that can be used to develop virtual field tours of its research sites.

Tim Keddy, Wood Fibre Development Specialist with CWFC, said that the organization has made significant strides over the past two decades establishing and demonstrating management and harvesting regimes for concentrated woody biomass, as well as fibre grown through high yield afforestation. He added that CWFC has successfully established a national network of short rotation, wood crop, technical development research sites.

Sidders pointed out that these sites are available to CFS scientists and researchers for their own research programs. As part of the Field Day, CFS researcher Dr. Jagtar Bhatti provided an example of how he has set up instruments on
CWFC plantation sites north of Edmonton, and in Manitoba and Ontario, related to measuring the plantation’s potential to function as a carbon sink over its growth cycle. This work has been completed in partnership with the University of British Columbia.

Among the 25 individuals taking part in the Field Day was Northern Forestry Centre Acting Director General, Ken Mallett.

“We encourage our CFS scientists to collaborate with Derek’s group,” said Mallett. “A lot of our researchers, the physiologists, the soil scientists, and the pest experts can also use the CWFC test sites as a natural laboratory for some of their work while helping Derek with his studies.”

He added that like the CWFC, the CFS is also interested in bio-energy and how that industry can be expanded in future, noting that there are obvious opportunities for collaboration with CWFC in this research area, given the number of hybrid poplar test sites it has developed which demonstrate different clones and management regimes for developing wood fibre as fuel for bio-energy production.

Mallett said that CWFC’s tests sites will also prove invaluable for the CFS’s Carbon Group, which works on a carbon model for Canada. CWFC’s unmanned aerial vehicle technology could also help to play a role in this area not only for its video capturing capability, but also the vehicles’ ability to carry measuring and monitoring devices above the forest canopy. Finally, he said that CWFC’s work with AITF on the Alberta Biochar Initiative could mesh well with the work that CFS is doing to investigate ways to reclaim and—possibly accelerate—growth of forest stands impacted by oil and gas industry activities.

For more information about CWFC partnership opportunities, please contact Derek Sidders at (780) 435-7355 or Derek.Sidders@nrcan.gc.ca

Forest management CTS program turning students on to new career options in forestry

By Tony Kryzanowski

Alberta high school students are now becoming better informed about various career opportunities in forest management and operations through credit courses delivered by Alberta Distance Learning Centre (ADLC).

With the assistance of resource support and forestry equipment provided by the Woodlands Operations Learning Foundation (WOLF), ADLC is reaching high school students, with the intent of attracting more students to occupations that have some measure of forest management in their job descriptions.

ADLC has been offering learning opportunities to meet the diverse and evolving needs of Alberta’s students and the work place since 1923.

As part of its commitment to provide innovative education at a distance, ADLC is now offering five, one-credit Career and Technology Studies (CTS) courses that can be completed online. The five online courses are Forests and Society, Forest Ecology in Regions of Canada, Forest Use and Protection, Forest Protection and Stewardship, and Forest Research.
and Development. They span the 10, 20 and 30 level. After completing the five courses, schools can apply for project work that involves a minimum of six hours of training on forest harvesting simulators with guidance from a qualified and experienced instructor, as well as discussion on careers in forestry.

After a pilot project involving five Alberta high schools last year, interest in the program has continued to grow. This year, Forestry is being offered in nine high schools across the province.

According to ADLC lead instructor Jacalyn Watson, every school that participated in the pilot project wants the program back, and five other schools are presently on a waiting list.

With students as far north as Fort Vermillion and as far south as Nobleford having taken the courses and simulator project, Watson says it was gratifying to offer the experience to students in areas where forestry is not well known or considered often as a career option.

“It was wonderful to see students that have never thought of forestry before suddenly say, ‘wow, I never thought of this’,” says Watson, particularly after they have had an opportunity to work with the harvesting simulators. At those times, she adds that ADLC tries to take that interest further and help students investigate actual career paths with industry.

Watson says that she has no doubt that students who have participated in the program have followed career paths into some aspect of forest management based on the responses she has heard from students so far. Based on those positive responses, ADLC is in the process of developing a high school credited project module with resource assistance from WOLF aimed specifically at careers in forestry and the pathways to get there.

“We want the students to develop an understanding of forestry as a resource and how to maintain its sustainability,” says Watson. “We also want to be able to open doors for students so that they can possibly find a career in it.”

WOLF Executive Director David Blackmore says partnering with ADLC on program development and delivery was an attractive opportunity, given the Centre’s experience working with the Alberta education system delivering credit courses to high school students, many of them online.

“There’s no question that the interest is there, and people want to take the courses,” says Blackmore.

WOLF provides educational services for operational workers through to professionals from the public, forest, petroleum and utilities sectors working, playing or just living on forested land.

“WOLF’s mission is to provide professional quality learning opportunities for people with a footprint on the forest land. These services are also available to pre-employment educators,” says Blackmore.

ADLC is also planning to partner with the Alberta Forest Products Association (AFPA) and its ‘Work Wild’ recruitment program to help motivated students make the transition from the classroom to forest industry jobs more easily and to advise them on where to find jobs.
For more information about the ADLC Forestry program, contact Jacalyn Watson at 1-866-774-5333, ext. 6321 or jacalyn.watson@adlc.ca or David Blackmore at (780) 532-9404 or dave.blackmore@telus.net

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**CNC-reinforced lightweight sandwich structure making strides with AI Bio support**

By Tony Kryzanowski

Cellulose nanocrystals (CNC) are a high value material that can be extracted from wood fibre. University of Alberta researchers are investigating how adding CNC to polystyrene components of a lightweight composite sandwich structure can produce a stiffer and stronger product, with potential applications in the construction, automotive and aerospace industries.

Alberta Innovates Bio Solutions (AI Bio) has provided $240,000 in financial support for the three-year project through its Bioindustrial Research and Innovation program. So far, the research team has developed a way to graft CNC onto polystyrene, resulting in polystyrene composite beads that can then be used to manufacture the structure’s foam core.

Furthermore, by applying CNC to reinforce the polystyrene electrospun layer, located between the top and bottom skins and core of the sandwich structure, this will decrease the premature delamination of the top and bottom skins and core layer and will also contribute to the structure’s overall strength and stiffness properties.

Dr. Cagri Ayranci, the project’s lead researcher and Assistant Professor at the University of Alberta’s Mechanical Engineering Department, says that the potential dividend for the forest industry in this project is finding valuable applications for CNC in high volumes, thereby creating a new income source for the industry.

“At present, we are optimizing the process parameters of producing the beads, but we are very, very happy with progress on the project so far,” says Dr. Ayranci. Supporting him on the project are Dr. Yaman Boluk from the university’s Civil Engineering Department and Dr. Mark McDermott from the university’s Chemistry Department. Both also work with the National Institute for Nanotechnology (NINT) and have been particularly helpful in developing a method to graft CNC on to the polystyrene.

Dr. Ayranci says they expect to have fully constructed sandwich structures —featuring the reinforced foam core and electrospun layers—to demonstrate to various industries within a year, and have received considerable interest from a variety of industry sectors concerning the product. They have also had interest shown from some companies that they didn’t expect.

Dr. Stan Blade, AI Bio Chief Executive Officer, says this project was chosen for financial support because of its obvious potential.

“The projects funded through our Bioindustrial Research and Innovation program hold great promise for increasing economic activity in Alberta’s bioindustrial sector, helping to strengthen and diversify our provincial economy,” says Blade. “Blending forest or agricultural fibre with existing materials or using the fibre in innovative ways may lead to