Research Library

Amélioration du rendement en valeur des opérations de récolte de feuillus tolérants

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Author:	Hamilton, Peter
Date:	September 2012
Edition:	39949
Material Type:	Research report
Physical Description:	8 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Veneer
	Value added
	Sorting
	Recovery
	Logs
	Hardwoods
	Hardwood iniative
	Iniative feuillis
	Advantage
Series Number:	Avantage ; Vol. 13, No. 5
Language:	French

Abstract: Les forêts de feuillus tolérants fournissent une vaste gamme de produits, notamment des billes dont la valeur varie de 45 à 1700 \$/m3. L'utilisaton de modèles de production convenant aux produits de commodité ne maximise pas la valeur qu'on peut tirer de ce type de forêt.

Documents

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An assessment of the concrete pole and steel light riser market for penetration by a laminated veneer pole technology

https://library.fpinnovations.ca/en/permalink/fpipub2043

Author:	Meil, J.K.
Date:	August 1988
Edition:	38576
Material Type:	Research report
Physical Description:	9 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Market Analysis
Subject:	Veneer
	Steel
	Sample
	Laminate product
	Alloy
Location:	Ottawa, Ontario
Language:	English
Abstract:	Assessment
	Concrete Pole
	Steel Light Riser
	Laminated Veneer Pole Technology

Documents

E1597.pdf

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Assessing new product opportunities for the veneer-based product industry

https://library.fpinnovations.ca/en/permalink/fpipub2762

Author: Wang, Brad J.
Dai, Chunping
Poon, James
Xu, H.

Date: June 2011

Edition: 39378

Material Type: Research report

Physical Description: 27 p.

Sector: Wood Products

Field: Wood Manufacturing & Digitalization

Research Area: Advanced Wood Manufacturing

Subject: Veneer
Utilization
Plywood
Markets

Series Number: W-2849

Location: Vancouver, British Columbia

Language: English

Abstract: Potential market gain for Canadian softwood plywood in residential construction could arise from the emerging Chinese market to build massive numbers of affordable apartments and the upcoming rebuilding effort in Japan following the earthquake and tsunami disaster. Compared to the main Chinese species (poplar), common BC species, such as Douglas-fir, spruce and hem-fir, have competitive advantages in the aspects of log diameter, wood properties and veneer quality and processing productivity. For non-residential construction, Canadian plywood concrete forms also offer competitive advantages over Chinese overlaid poplar counterparts due to their higher stiffness and strength. However, the production cost has to be kept to below US$ 500/m3 for a profit margin. Further, three-ply and four-ply Canadian softwood plywood panels are ideally suited for the base materials of multi-layer composite floor, which currently is gaining momentum in China and other countries.

A sizeable increase in industrial and remodelling market is anticipated for the Canadian plywood industry. This will be mainly driven by a number of specialty plywood products, such as container floor and pallet, light truck, utility vehicle, trailer and camper manufacturing. However, these products are not commonly manufactured by larger commodity manufacturers in Canada. China is currently the largest global supplier of container floors, most of which are made from imported plywood, bamboo and poplar veneer. To meet their stringent requirements and gain a market share, Canadian plywood industry should take appropriate actions in adjusting veneer thickness, veneer grade, veneer treatment, and panel lay-up.

Japan has developed customized products such as oversized plywood for wall applications, and termite/mould resistant plywood for above ground and ground-contact applications. China has developed numerous new value-added veneer products for niche markets. Such products include marine plywood, sound reducing plywood, non-slip plywood, metal faced plywood, curved plywood and medium density fiberboard (MDF) or particleboard (PB)-faced plywood.

In order to stay competitive in the global market, Canadian plywood industry needs to:

- remove the trade constraints between softwood plywood and hardwood plywood,
- remove in-plant manufacturing barriers to deal with both softwood and hardwood processing,
- diversify products for both appearance and structural based applications, and
- develop new value-added products for niche markets.

This study suggests the following opportunities for Canadian plywood producers to

- incorporate naturally decay-resistant species such as cedar as surface veneer and/or perform veneer or glueline treatment to make marine and exterior plywood for improved durability,
- characterize veneer properties from the changing resource for better utilization,
- peel some thinner and higher quality veneer for making specialty plywood,
- conduct stress grading in combination with visual grading to maximize value recovery from the available resource,
- increase the flexibility of panel lay-up for domestic/overseas markets and various applications,
- develop mixed species plywood by mixing available hardwood species such as birch, maple, alder, aspen veneer (as overlay materials) with softwood plywood to achieve better appearance and higher performance,
- develop new structural composite lumber (SCL) products such as veneer strand lumber (VSL) from low quality logs, particularly beetle-killed, and random veneer or waste veneer,
- develop new drying, pressing and adhesive technologies for processing high moisture veneer, particularly hem-fir and spruce, to improve productivity and bond quality and reduce panel delamination,
- develop light weight and strong hybrid plywood panels for furniture applications, by adding MDF or PB on the face of plywood,
- develop hybrid plywood for floor applications to reduce thickness swell and increase dimensional stability and stiffness,
- develop hybrid cross-laminated timber (CLT) panels from lumber, plywood and laminated veneer lumber (LVL) for low- and mid-rise residential and non-residential applications, and
- develop a series of new product standards for specialty plywood.

A market research study for each product opportunity is recommended to develop a solid business case for each.

Composite products - Markets

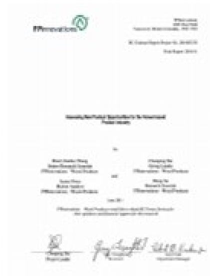
Plywood - Markets

Plywood - Utilization

Veneers - Markets

Veneers - Utilization

Documents



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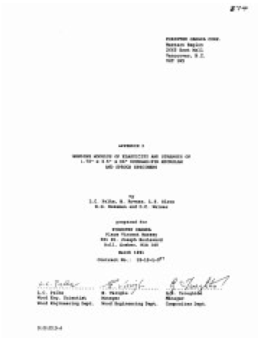

Bending modulus of elasticity and strength of 1.75" x 3.5" x 96" Douglas-fir microlam and spruce specimens

https://library.fpinnovations.ca/en/permalink/fpipub5495

Author:	Palka, L.C.
	Rovner, B.
	Olson, L.
	Wakeman, R.G.
	Walser, D.C.
Date:	March 1991
Edition:	37257
Material Type:	Research report
Physical Description:	12 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Veneer
	Mechanical properties
	Laminate product
Series Number:	Appendix 2 to Forestry Canada No. 35
	Contract no. 1812L007
	W-874
Location:	Vancouver, British Columbia
Language:	English
Abstract:	The purpose of this small study was to examine the effect of various test methods upon the bending moduli of elasticity and to determine the bending strength of selected Douglas-fir and spruce laminated veneer lumber specimens.
	Lumber, Laminated veneer - Strength

Documents

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Characterizing aspen veneer for LVL/plywood products. Part 1. Stress grades of veneer|Characterizing aspen veneer for LVL/plywood products

https://library.fpinnovations.ca/en/permalink/fpipub1157

Author:	Wang, Brad J.
Date:	July 2001
Edition:	37589
Material Type:	Research report
Physical Description:	14 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Veneer manufacturing Veneer Populus Plywood manufacture Plywood Laminate product Aspen
Series Number:	W-1791
Location:	Vancouver, British Columbia
Language:	English

Abstract: In this work, the properties of aspen veneer from two mills (A and B) were compared. The comparisons between the incised veneer and non-incised veneer for mill A were made in terms of veneer thickness, ultrasonic propagation time (UPT), density and MOE. The aspen veneer was further characterized for LVL/plywood products by tailoring veneer grades to the requirements of final veneer products. In addition, MOE-based veneer stress grading and UPT-based veneer stress grading were compared for the aspen veneer. The advantages of MOE-based veneer stress grading over UPT-based veneer stress grading were identified in terms of veneer grade MOE and volume breakdown. The main results are summarized as follows:

1) Aspen veneer properties change from mill to mill. The differences in aspen veneer density and MOE between mill A and B are significant with mill A producing denser and stronger aspen veneer.

2) For aspen veneer in the mill A, the distribution shapes of veneer thickness, UPT, density and MOE between the non-incised and incised veneer are quite similar. Although the differences in veneer thickness, UPT and density between the non-incised veneer and incised veneer are identified as significant, the difference in veneer MOE is not significant due to the effect of both veneer UPT and density. The incised veneer has a slightly higher variation in thickness and is also slightly thicker compared to the non-incised veneer. This could due to the change of lathe settings or the property variation of aspen species as indicated with the veneer density variation.

3) Of the aspen veneer from mill A, using the optimum UPT thresholds,

about 27.5 ~ 30.9% can be extracted through veneer stress grading to make 2.0 million psi LVL; about 43.4 ~ 59.9% can be sorted out for 1.8 million psi LVL; and the remaining 12.6 ~ 25.7% can be used for 1.5 million psi LVL or for plywood. It was also found that the incised aspen veneer generates 3.4% less of top stress grade G1 but 16.5% more of stress grade G2 compared to the non-incised aspen veneer if performing the optimum UPT-based stress grading.

4) The MOE-based veneer stress grading not only results in a smaller variation in MOE of each grade, but also higher volume percentages of stress grades G1 and G2 compared to the UPT-based veneer stress grading. This smaller variation in MOE of each stress grade will be very beneficial to the industry and structural applications since higher design stress can be assigned for the wood structural components. Also the higher percentages of stress grades G1 and G2 with the MOE-based veneer stress grading has significant economical implications and should be recognized by the industry.

5) To maximize mill profits, veneer sheets need to be periodically sampled and analyzed using the VGrader software. The optimum grading thresholds for the specific veneer can be established for on-line veneer stress grading based on the current market and requirements of final veneer products, providing a real solution to characterize and make best use of the specific veneer for LVL/plywood products.

Veneers - Manufacture - Tests

Populus - Veneers

Plywood - Manufacture

Lumber, Laminated veneer - Manufacture

Documents

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Characterizing aspen veneer for LVL/plywood products. Part 2. LVL pressing strategies and strength properties|Manufacturing characteristics and strength properties of aspen LVL using stress graded veneer

https://library.fpinnovations.ca/en/permalink/fpipub1158

Author:	Wang, Brad J.
Date:	August 2001
Edition:	37590
Material Type:	Research report
Physical Description:	41 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Veneer manufacturing
	Veneer
	Mechanical properties
	Populus
	Laminate product
	Aspen
Series Number:	W-1792
Location:	Vancouver, British Columbia
Language:	English

Abstract:

In this study, aspen veneer sheets were sampled from a Forintek member mill. Their attributes and properties were measured. Using the optimum stress grading strategy, aspen veneer was segregated into 3 distinct stiffness groups (stress grades G1, G2 and G3) and conditioned to 3 different moisture levels. An experimental design for 3-level four factors comprising veneer moisture content, veneer stress grade, mat pressure and glue spread (or resin level) was adopted. Based on the experimental design, LVL panels with different combinations of four factors were pressed until the target core temperature reached 1050C to achieve full cure followed by a stepwise decompression cycle. The LVL panel final thickness, density, compression ratio and relevant strength properties were measured. After that the effect of aspen veneer moisture, stress grade, mat pressure and glue spread and their relative importance on LVL compression behavior, hot-pressing and strength properties were evaluated using a statistical analysis program. The relationship between LVL panel properties and veneer properties was examined. Finally a method to enhance LVL modulus of elasticity (MOE) to make high stiffness LVL was discussed. From this study, the following results were found:

Aspen veneer is capable of making LVL products meeting 1.8 and 2.0 million psi MOE requirements. Optimum veneer stress grading and proper pressing schedule are two important keys to the manufacture of high-stiffness aspen LVL products. Further, a possibility to make high-grade aspen LVL meeting 2.2 million psi MOE exists by proper veneer densification and optimum veneer stress grading.

The roles of four factors affecting LVL pressing behavior and strength properties are quite different. Glue spread and mat pressure, rather than stress grade and veneer moisture content, are two main factors affecting hot-pressing time taken for the core to reach 1050C. With incised veneer, the moisture from the glue in the glueline affects the rise of core temperature more pronouncedly than the moisture in the veneer, and is more critical to the cure of the glue. High glue spread (44 lbs/1000ft2) not

only significantly increases the hot pressing time taken for the core to rise to 1050C, but overall also decreases most LVL strength properties with the pressing schedule used. High mat pressure does not necessarily result in high LVL panel compression due to the high gas pressure that occurs in the core.

Veneer stress grade and veneer moisture are the two predominant factors that mostly affect LVL strength properties. LVL panels assembled with high stress grade result in increases in both flatwise and edgewise MOE and MOR properties rather than shear strength either longitudinal or through-the-thickness. Further, using high stress grade veneer can help make more efficient structural systems in terms of both stiffness-to-weight and bending strength-to-weight ratios compared to using low stress grade veneer. High veneer moisture at 6% impairs all LVL strength properties except edgewise bending MOE.

LVL compression ratio can help link veneer MOE with LVL panel edgewise bending MOE. Overall, every increase of 1% in LVL compression ratio would result in 1% increase in LVL and veneer MOE ratio. With regard to aspen LVL MOE enhancement, using high veneer stress grade gains slightly less than using low veneer stress grade. On average, every increase of 1% in aspen LVL compression ratio results in 0.82%, 1.05% and 1.20% increase in aspen LVL and veneer MOE ratio assembled with stress grades G1, G2 and G3, respectively. In practice, those conversion factors for any specific veneer can be derived based on the correlation between veneer MOE and MOE of target LVL/plywood products made with proper pressing schedules, and be further used to derive requested veneer MOE for each stress grade to perform the optimum veneer stress grading.

Pressing schedules show significant effect on aspen LVL compression behavior and strength properties. Using a pressing schedule with step-wise decompression cycles following the core temperature to rise to 1050C, an excessive compression of LVL in the range of 13.5% to 27.6% is generated which results in high-stiffness LVL with an average MOE of approximate 2.0 million psi for all experiments. Although this pressing schedule has slightly longer pressing time and off-target LVL thickness than current commercial LVL pressing schedules, it helps enhance the strength properties of LVL.

It is recommended that further work should include the effect of different decompression cycles and mat pressure on LVL panel compression ratio and strength properties.

Populus - Veneers - Strength

Veneers - Manufacture - Tests

Lumber, Laminated veneer - Manufacture

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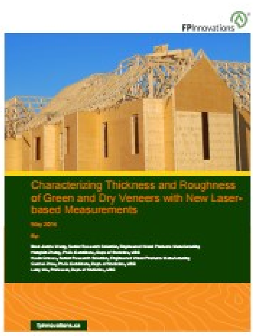

Characterizing Thickness and Roughness of Green and Dry Veneers with New Laser-based Measurements

Characterizing thickness and roughness of green and dry veneers with new laser-based measurements

https://library.fpinnovations.ca/en/permalink/fpipub5780

Author:	Wang, Brad J.
	Zhang, H.
	Groves, C. Kevin
	Zhou, G.
	Wu, L.
Contributor:	Natural Resources Canada. Canadian Forest Service.
Date:	May 2014
Edition:	39834
Material Type:	Research report
Physical Description:	21 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Measurement
	Thickness
	Veneer
Series Number:	W-3098
Language:	English

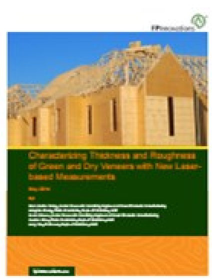
Abstract: A new laser-based system was successfully developed in the pilot plant for veneer thickness and roughness measurements. This system was tested for both green and dry spruce veneer. The comparisons were made between the green veneer measurement and dry veneer measurement, and between the laser-based system measurement and actual digital measurement. A linear mixed effect model was used to estimate the within-sheet and between-sheet variations of veneer thickness and roughness and their causes.

A good correlation was found between the laser-measured thickness and caliper-measured thickness. The laser-measured average roughness could also capture the trend of veneer surface roughness determined by the visual classification. Thus, the new laser-based system can be a useful tool for measuring both veneer thickness and roughness.

For veneer thickness, the within-sheet variation seemed to be larger than the between-sheet variation, and the laser-based measure had a larger variation than the digital-based measure for both green and dry veneer sheets. With the green veneer, higher veneer moisture content and density would lead to a larger difference between the two measurements. The laser-based method tended to classify more "thick" sheets than the digital-based method, but this tendency was not obvious with the dry veneer. Such tendency also became negligible by factoring in either veneer moisture content or density. Thus, in the real applications, the accuracy of the new laser system can be improved for measuring green veneer thickness with a calibration of moisture content and/or density.

For veneer roughness, the within-sheet variation was again larger than the between-sheet variation, and the dry veneer had a larger variation than the green veneer. Further, the tight side variation was generally larger than the loose side variation. The above information is deemed useful for establishing an overall veneer quality criterion for industrial applications. Further work is scheduled to adopt the new laser-based system for real-time measurement of green veneer thickness and roughness.

Documents



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A comparison of production systems for aspen veneer logs in northern Ontario

https://library.fpinnovations.ca/en/permalink/fpipub40608

Author:	Gingras, Jean-François
Date:	2002
Material Type:	Research report
Physical Description:	12 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Veneer Stumps Satellite Roads Processing Aspen Advantage
Series Number:	Advantage ; Vol. 3, No. 48
Language:	English
Abstract:	This summary report presents the main findings of a study of systems for the production of aspen veneer logs in northern Ontario. The case studies, which took place in 2001 and 2002, covered four types of operations: in-woods chipping, satellite yards, roundwood merchandizing at roadside, and roundwood production at the stump. The advantages and disadvantages of each system for the production of veneer logs are given, along with production cost estimates for each system. A report presenting further productivity and quality data, and a detailed cost analysis (in an Excel spreadsheet) are available to FERIC members and partners on request.
	Aspen Veneer production In-woods chipping Satellite yards Merchandizing At-the-stump processing Roadside processing

Documents

ADV3N48.PDF

Computer programs for improved quality control procedures in plywood manufacture : Part II. Batch system measurement of veneer quality

https://library.fpinnovations.ca/en/permalink/fpipub37079

Author:	Warren, S.R.
	Steiner, P.R.
	Walser, D.C.
Date:	May 1985
Material Type:	Research report
Physical Description:	5 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Veneer
	Quality control
	Qualitative analysis
	Peeling
Series Number:	W-291
Location:	Vancouver, British Columbia
Language:	English
Abstract:	Veneers - Peel quality - Computer programming

Documents

291.pdf

Computer programs for improved quality control procedures in plywood manufacture : Part I. On-line veneer thickness

https://library.fpinnovations.ca/en/permalink/fpipub37078

- Author: Warren, S.R.; Steiner, P.R.; Walser, D.C.
- Date: May 1985
- Material Type: Research report
- Physical Description: 6 p.
- Sector: Wood Products
- Field: Wood Manufacturing & Digitalization
- Research Area: Advanced Wood Manufacturing
- Subject: Veneer; Quality control; Qualitative analysis; Plywood manufacture; Plywood; Peeling
- Series Number: W-290
- Location: Vancouver, British Columbia
- Language: English
- Abstract: Plywood - Manufacture - Computer programming; Veneers - Peel quality - Computer programming

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