Accelerated durability testing of wood-base fiber and particle panel materials

Author:	Unligil, H.H.
Date:	March 1982
Edition:	37999
Material Type:	Research report
Physical Description:	7 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Wood Panels Materials
Series Number:	CFS/DSS project no 12/81-82 3-65-57-016 E-23
Location:	Ottawa, Ontario
Language:	English
Abstract:	Composite materials - Durability Wood-based panels Wood-based panels - Durability Wood Based Composites

Documents

E23.pdf

Read Online

Download

Caractérisation du trait de scie permettant le collage sur chant du bois franc : rapport d'étape

https://library.fpinnovations.ca/en/permalink/fpipub42292

Author:	Tremblay, Carl
Date:	July 2004
Material Type:	Research report
Physical Description:	8 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Advanced Wood Materials
Subject:	Kerf Sawing Panels Joints
Series Number:	General Revenue 4024
Location:	Sainte-Foy, Québec
Language:	French

Abstract: Des visites industrielles auprès des producteurs et des utilisateurs de panneaux collés sur chant ont été effectuées afin de définir ce qu'est un collage sur chant de qualité pour les produits d'apparence. Cette enquête répondait ainsi au premier objectif spécifique du projet. Lors des visites, des panneaux collés avec joints de bonne et de mauvaise qualité ont été recueillis pour examen au laboratoire de Forintek. Des mesures effectuées au microscope ont permis d'établir à 0.05 mm la valeur maximale acceptable de largeur du joint de colle d'un panneau. Les principales causes de joints problématiques propres à l'opération de délignage des bandes sont l'éclatement des fibres du bois sur l'arête, la trop grande rugosité de la surface sur chant et la mauvaise rectitude du trait de scie. La proportion de panneaux rejetés reliés à ces causes varie de 0.5 à 3 %. Les fentes en bouts et les joints ouverts aux extrémités dus à un retrait en largeur des bandes de bois suite à un séchage sont responsables d'une plus grande proportion de rejets de panneaux.

La plupart des usines visitées utilisent une scie à refendre à lame unique pour le délignage de bandes de largeur variable. Les modèles de déligneuse Mattison 202 et 404 sont utilisés dans la majorité des cas. Toutefois, certaines usines utilisent des modèles à scies multiples. Suite au délignage, la qualité du trait de scie est vérifiée de façon visuelle seulement. La présence de la pointe de diamant sur chant est utilisée comme indice de qualité collage. La seconde année du projet portera sur l'identification et le développement de méthodes d'évaluation des paramètres affectant la qualité collage.

Sawing - Kerf

Panels - Joints, Glued

Documents

E3937.pdf

Read Online

Download

Caractérisation du trait de scie permettant le collage sur chant du bois franc : rapport final

https://library.fpinnovations.ca/en/permalink/fpipub42294

Author:	Tremblay, Carl
Date:	March 2005
Material Type:	Research report
Physical Description:	19 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Advanced Wood Materials
Subject:	Kerf
	Sawing
	Panels
	Joints
Series Number:	General Revenue 4024
Location:	Sainte-Foy, Québec
Language:	French

Abstract:

Des visites industrielles auprès des producteurs et des utilisateurs de panneaux collés sur chant ont été effectuées afin de définir ce qu'est un collage sur chant de qualité pour les produits d'apparence. Lors des visites, des panneaux collés avec joints de bonne et de mauvaise qualité ont été recueillis pour examen au laboratoire de Forintek. Des mesures effectuées au microscope ont permis d'établir à 0.05 mm la valeur maximale acceptable de largeur du joint de colle d'un panneau. Les principales causes de joints problématiques propres à l'opération de délignage des bandes sont l'éclatement des fibres du bois sur l'arête, la trop grande rugosité de la surface sur chant et la mauvaise rectitude du trait de scie bien que l'angle d'équerre de la scie constitue aussi un paramètre critique. La proportion de panneaux rejetés en usines reliés à ces causes varie de 0.5 à 3 %.

Des mesures de rugosité sur un échantillon de bandes recueillies en usines ont permis d'établir des valeurs représentatives de rugosité sur chant de bandes utilisées à la production industrielle de panneaux. Des mesures de rugosité sur des bandes délignées en laboratoire ont démontré les effets importants du modèle de scie et de la vitesse d'alimentation, ou avance par dent, sur les valeurs de rugosité sur chant. Des mesures effectuées sur des bandes délignées à partir de scies usées ont démontré que la rugosité sur chant ne permet pas de détecter le niveau d'usure d'une scie, les valeurs moyennes de rugosité étant similaires à celles de bandes délignées à l'aide de scies bien affûtées.

Suite à la fabrication de panneaux en laboratoire à partir de bandes présentant une large gamme de rugosité sur chant, des mesures ont démontré l'augmentation de la largeur des joints de colle, l'augmentation de la proportion des joints de largeur supérieure à 0.05 mm (trop apparents) et la diminution de la résistance en cisaillement des joints de colle avec l'accroissement de la rugosité sur chant des bandes. Les paramètres de collage (type de colle, pression aux serres, température ambiante, etc.) furent gardés constants pour la fabrication de l'ensemble des panneaux.

Finalement, en fonction des résultats obtenus dans le cadre de cette étude, des valeurs de rugosité sur chant Ra et Rt de 9 µm et 80 µm respectivement peuvent être considérées comme des valeurs permettant la fabrication à grand volume de panneaux avec joints de colle de qualité, une augmentation de la rugosité sur chant résultant en des joints de colle plus apparents.

Sawing - Kerf

Panels - Joints, Glued

Documents

E3939.pdf

Read Online

Download

Characterization of ripsaw kerf for edge-glueing hardwood strips : final report

https://library.fpinnovations.ca/en/permalink/fpipub42405

Author:	Tremblay, Carl
Date:	March 2005
Material Type:	Research report
Physical Description:	18 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Advanced Wood Materials
Subject:	Kerf
	Sawing
	Panels
	Joints
Series Number:	General Revenue Project No. 4024
Location:	Sainte-Foy, Québec
Language:	English

Abstract:

Mill visits to manufacturers and users of edge-glued panels were conducted in order to characterize the quality of edge-glued joints in appearance products. During these visits, panels with gluelines of good and poor quality were collected for further analysis in Forintek's laboratory. Microscopic measurements served to determine that the maximum acceptable width of glue joints in edge-glued panels is 0.05 mm. The main causes of troublesome gluelines resulting from ripping operations are splintering at the juncture of the edge and flat surface, excessive edge roughness, and uneven straightness of the saw kerf, although the right angle of the saw is also a critical parameter. The percentage of mill-rejected panels as a result of these problems ranges from 0.5% to 3%.

A series of edge roughness measurements taken from a sample of strips from participating mills set the stage for the development of representative roughness values for the edges of strips used in the industrial production of edge-glued panels. Edge roughness measurements taken from strips ripped in the laboratory showed the impact of various factors on edge roughness values: saw blades, feed speed and chip load. Measurements taken from edges ripped with worn saw blades indicated that edge roughness cannot be used to determine saw blade wear values because average roughness values obtained with such blades were found to be similar to those of strips ripped with well-sharpened saws.

Following the laboratory assembly of panels using strips exhibiting a wide range of edge roughness, measurements revealed that edge roughness contributes to increased glueline width, a greater proportion of gluelines wider than 0.05 mm (too apparent) and a reduction in glueline shear strength. Glueing parameters (type of glue, clamp pressure, ambient temperature, etc.) were constant throughout the production of laboratory panels.

Finally, the results of this study suggest that edge roughness values of 9 µm for Ra and 80 µm for Rt allow large-volume manufacturing of panels with good quality gluelines and that an increase in edge roughness will result in more apparent gluelines.

Sawing - Kerf

Panels - Joints, Glued

Documents

E4347.pdf

Read Online

Download

Checking in CLT panels : an exploratory study

https://library.fpinnovations.ca/en/permalink/fpipub2772

Author:	Casilla, Romulo C.
	Lum, Conroy
	Pirvu, Ciprian
	Wang, Brad J.
Date:	December 2011
Edition:	39389
Material Type:	Research report
Physical Description:	29 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Building Systems
Subject:	Panels tests
	Panels
	Laminate product
	Building construction
Series Number:	Transformative Technologies # TT1.07
	W-2877
Location:	Vancouver, British Columbia
Language:	English

Abstract: A study was conducted with the primary objective of gathering information for the development of a protocol for evaluating the surface quality of cross-laminated timber (CLT) products. The secondary objectives were to examine the effect of moisture content (MC) reduction on the development of surface checks and gaps, and find ways of minimizing the checking problems in CLT panels. The wood materials used for the CLT samples were rough-sawn Select grade Hem-Fir boards 25 x 152 mm (1 x 6 inches). Polyurethane was the adhesive used. The development of checks and gaps were evaluated after drying at two temperature levels at ambient relative humidity (RH).

The checks and gaps, as a result of drying to 6% to 10% MC from an initial MC of 13%, occurred randomly depending upon the characteristics of the wood and the manner in which the outer laminas were laid up in the panel. Suggestions are made for minimizing checking and gap problems in CLT panels. The checks and gaps close when the panels are exposed to higher humidity.

Guidelines were proposed for the development of a protocol for classifying CLT panels into appearance grades in terms of the severity of checks and gaps. The grades can be based on the estimated dimensions of the checks and gaps, their frequency, and the number of laminas in which they appear.

Building construction - Laminated

Laminated products

Panels - Tests

Documents

2877.pdf

Read Online

Download

China's non-structural panel market in furniture and interior finish

https://library.fpinnovations.ca/en/permalink/fpipub1241

Author: Wahl, A.

Contributor: Wood Panel Bureau and Forestry Innovation Investment

Date: April 2004

Edition:	37692
Material Type:	Research report
Physical Description:	152 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Market Analysis
Subject:	Utilization
	Panels
	Markets
	China
	Furniture
Series Number:	4283
	W-2048
Location:	Vancouver, British Columbia
Language:	English

Abstract: This project evaluates the potential for non-structural panels in the furniture (including cabinetry) and interior finish industries in China. It entailed two stages:
1. Review of existing information on non-structural panel markets and industry in China;
2. Survey of wood-based panel manufacturers and non-structural panel specifiers in China.
137 furniture and 132 interior finish manufacturers in eastern and southern China were surveyed by phone, mail/fax, and in personal interviews. Personal interviews were carried out with 11 panel mills in the eastern region.
The literature review is based on the Preliminary Competitor Analysis for Wood Products in China (Wahl and Gaston, 2003) that was carried out for Forestry Innovation Investment. Information specific to furniture, other non-structural panel markets and more recent publications have been added to this literature review.

Board products - Utilization - China

Furniture - Markets - China

Markets - China

Finishes

Panels

Documents

2048.pdf

Read Online

Download

Collaborative development of novel hollow core composite panels for value-added secondary applications

https://library.fpinnovations.ca/en/permalink/fpipub2598

Author:	Deng, James
Contributor:	Natural Resources Canada. Canadian Forest Service
Date:	March 2009
Edition:	39192
Material Type:	Research report
Physical Description:	47 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Panels
Series Number:	Value to Wood No. FCC 07 ; 6002
Location:	Québec, Québec
Language:	English
Abstract:	A research project was carried out in collaboration with researchers from both University of British Columbia and University of Toronto to develop and test a range of hollow core composite sandwich panels based on lignocellulosic materials that can extend the current applications of wood composite products such as high density particleboard and fibreboard (hardboard and MDF). With proper engineering design and unique light weight structural features, wood fibre resources will be more effectively used and the performance of each component can be maximized in these types of novel composite panels. The outcome of this project is the development of Canadian-made light weight panels containing various low density cores, including honeycomb, low density wood wool composites and cup-shaped thin fibreboard, and high density surface panels, including plywood, hardboard and high density fibreboard (HDF) for the applications in ready to assemble (RTA) modular furniture, home and commercial cabinetry and door panels. The work completed at Forintek included: Development of low density wood wool panels (LCD) as the core material for the sandwich panels. Development of cup-shaped high density fibreboard (CHDF) as the core material Evaluation of edgewise and flat compression strength and creep behaviour of honeycomb sandwich panels fabricated by UBC. Development of book shelf panels using four different core materials. Performance evaluation of the book shelves developed. The results of the experimental work suggest that:

Low density composite core materials can be made by the technology developed at Forintek laboratory using low density poplar wood wool and high viscosity phenol and formaldehyde resin with steam injection hot pressing technology. However, the strength of the panels was relatively low comparing to conventional low density particleboard, OSB or fibreboard.

The experimental work carried out on the cup-shaped high density fibreboard (CHDF) show the potential for developing various light weight core materials using current MDF process technology. The internal bond strength (IB) and water absorption (WA) of the cup-shaped panels were strongly correlated with panel density. IB increased and WA reduced when increasing the panel density. The flexibility of the technology could optimize the properties and performance of CHDF through manipulating the fibre refining process, profile design, resin system and hot pressing strategy. It shows that CHDF is a good alternative material to Kraft paper honeycombs for the manufacture of sandwich panels for higher strength and performance applications.

Test results from sandwich panels made of cup-shaped fibreboard core and HDF surface show that the nominal density of the cup-shaped core was one of the most important process parameters to adjust for the improvement of the sandwich panel properties. The flat compressive modulus, flat tensile strength and short-beam strength increased when increasing the nominal density of the core panels. Furthermore, the overall density of the sandwich panels were only fractionally increased by increasing the nominal density of the core panels due to the cup-shaped shape of the core panels. It suggests that higher nominal core density should be used when higher mechanical strength of the panels is required.

To a lesser extent, fibre type in the core panels also affects the sandwich panel properties. Longer wood fibres are recommended for use in the manufacture of the core panels.

The results of the experiment also show that increasing the thickness of the surface HDF panels increased the bending strength of the sandwich panels substantially. However, the overall density also increased.

Comparing shear properties of the four different sandwich panels developed by Forintek, we can identify that the ultimate shear strengths were different for different core materials. The sandwich panel made from polycarbonate core had the highest shear strength (0.744 MPa) followed by the panel made with CHDF (0.497 MPa). The sandwich panel made from low density wood wool core had much lower shear strength (0.012 MPa) which is lower than the paper honeycomb sandwich panels previously made by UBC with the same surface and core thickness (0.024 MPa).

The sandwich panels made with high density cup-shaped fibreboard had significantly higher core shear modulus (92.0 MPa) than any other sandwich panel studied in this project.

Hollow core

Composite panels

Documents

E4489.pdf

Read Online

Download

Comparative swelling tests on waferboard and oriented strandboard

https://library.fpinnovations.ca/en/permalink/fpipub38214

Author:	Alexopoulos, J.
	Pfaff, Frank
Date:	March 1988
Material Type:	Research report
Physical Description:	78 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Wood
	Waferboards
	Swelling
	Strands
	Shrinkage
	Panels
	Oriented strandboard
	Orientation
Series Number:	CFS project no.3
	E-744
Location:	Ottawa, Ontario
Language:	English
Abstract:	Waferboard - Swelling
	Oriented Strand Board - Swelling
	Wood Based Panels - Swelling
	Swelling and shrinkage

Documents

E744.pdf

Read Online

Download

Computer simulation model of hot-pressing process of LVL and plywood products

https://library.fpinnovations.ca/en/permalink/fpipub5575

Author:	Wang, Brad J.
	Yu, C.
Date:	April 2003
Edition:	37655
Material Type:	Research report
Physical Description:	23 p.
Sector:	Wood Products
Field:	Wood Manufacturing & Digitalization
Research Area:	Advanced Wood Manufacturing
Subject:	Veneer
	Simulation
	Plywood
	Panels
	Materials
	Laminate product
	Hot press
	Gluing
Series Number:	2019
	W-1965
Location:	Vancouver, British Columbia
Language:	English

Abstract: Laminated Veneer Lumber (LVL) and plywood are the two major veneer-based wood composite products. During LVL/plywood manufacturing, the hot pressing process is crucial not only to the quality and productivity, but also to the performance of panel products. Up to now, the numerical simulation of the hot-pressing process of LVL/plywood products is not available.

To help understand the hot-pressing process of veneer-based wood composites, the main objective of this study was to develop a computer simulation model to predict heat and mass transfer and panel densification of veneer-based composites during hot-pressing. On the basis of defining wood-glue mix layers through the panel thickness, a prototype finite-element based LVL/plywood hot-pressing model, VPress®, was developed to simulate, for the first time, the changes of temperature, moisture and vertical density profile (VDP) of each veneer ply and glueline throughout the pressing cycle. This model is capable of showing several important characteristics of the hot-pressing process of veneer-based composites such as effect of glue spread level, veneer moisture, density, platen pressure and temperature as well as pressing cycles on heat and mass transfer and panel compression. Experiments were conducted using several different variables to validate the model. The predicted temperature profiles of the veneer plies and gluelines (especially at the innermost glueline) by the model agree well with the experimental measurements. Hence, the model can be used to evaluate the sensitivity of the main variables that affect hot-pressing time (productivity), panel compression (material recovery) and vertical density profile (panel stiffness). Once customized in industry, the new model will allow operators to optimize the production balance between productivity, panel densification and panel quality or stiffness. This hot-pressing model is the first step in facilitating the optimization of the pressing process and enhanced product quality.

Veneers

Panels - Production - Computer simulation

Density - Computer simulation

Composite materials - Density

Plywood - Density

Lumber, Laminated veneer

Gluing - Processes - Hot press

Documents

1965.pdf

Read Online

Download

Creep and creep-rupture behaviour of wood-based structural panels

https://library.fpinnovations.ca/en/permalink/fpipub5502

Author:	Laufenberg, T.L. Palka, L.C. McNatt, J.D.
Date:	February 1994
Edition:	37293
Material Type:	Research report
Physical Description:	45 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Building Systems
Subject:	Mechanical properties Panels
Series Number:	W-975
Location:	Vancouver, British Columbia
Language:	English
Abstract:	The highlights of a co-operative research program developed by the U.S. Forest Products Laboratory (FPL) and Forintek Canada Corp. to provide detailed creep-rupture and some creep information for composite panel products are summarized here. Support for this program has been provided by the American Plywood Association, The Waferboard Association (now the Structural Board Association), as well as the U.S. and Canadian Forest Services. Commercially produced plywood, oriented strandboard (OSB), and waferboard were tested to identify three mills that produced panels with high, low and median flexural creep performance. These three plywood, three OSB, and three waferboard products were then extensively tested to provide information on their duration of load and creep performance. Creep Panels - Strength

Documents

975.pdf

Read Online