Fire performance of mass timber

https://library.fpinnovations.ca/en/permalink/fpipub8293

Author: Dagenais, Christian
Ranger, Lindsay

Date: Avril 2021
Material Type: Research report
Physical Description: 6 p.
Sector: Wood Products
Field: Sustainable Construction
Research Area: Advanced Wood Materials
Subject: Fire
Building codes
Models
Performance
Standards
Timber
Language: French

Abstract: La construction massive en bois est relativement nouvelle et sera bientôt intégrée dans le Code national du bâtiment du Canada (CNB). Il s'agit d'une solution à base de bois à prix compétitif qui complète les systèmes existants à ossature en bois et de construction en gros bois d'œuvre et constitue une option appropriée pour certaines applications qui utilisent actuellement du béton, de la maçonnerie ou de l'acier.

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Performance au feu du bois massif

https://library.fpinnovations.ca/en/permalink/fpipub8294

Author:	Dagenais, Christian
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Date:	Avril 2021
Material Type:	Research report
Physical Description:	6 p.
Sector:	Wood Products
Field:	Sustainable Construction
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Subject:	Construction
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Language:	French
Abstract:	La construction massive en bois est relativement nouvelle et sera bientôt intégrée dans le Code national du bâtiment du Canada (CNB). Il s'agit d'une solution à base de bois à prix compétitif qui complète les systèmes existants à ossature en bois et de construction en gros bois d'œuvre et constitue une option appropriée pour certaines applications qui utilisent actuellement du béton, de la maçonnerie ou de l'acier.

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Fire performance of mass timber

https://library.fpinnovations.ca/en/permalink/fpipub8295

Author:	Dagenais, Christian
	Ranger, Lindsay
Date:	April 2021
Material Type:	Research report
Physical Description:	5 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Advanced Wood Materials
Subject:	Construction
	Fire
	Building codes
	Models
	Performance
	Standards
	Timber
Language:	English
Abstract:	Mass timber construction is a relatively new type of construction soon to be implemented in the National Building Code of Canada (NBCC). It is a cost-competitive wood-based solution that complements existing wood-frame and heavy timber systems and is a suitable candidate for some applications which currently use concrete, masonry and/or steel.

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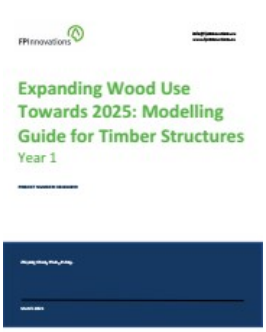
Expanding wood use towards 2025: modelling guide for timber structures, year 1

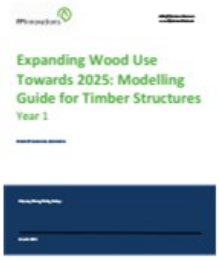
https://library.fpinnovations.ca/en/permalink/fpipub7976

Author:	Chen, Zhiyong



Contributor:	Engineered Wood Assocation (APA) American Wood Council (AWC)
Date:	March 2021
Material Type:	Research report
Physical Description:	23 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Advanced Wood Materials
Subject:	Cross Laminated Timber (CLT) Performance Building construction Building materials Models Standards
Series Number:	Expanding wood use towards 2025
Language:	English
Abstract:	Computer modelling is an essential part in the analysis and design of mid- and high-rise residential and commercial buildings as well as long-span structures. It is also a valuable tool in the optimisation of wood-based products, connections, and systems. An FPInnovations' survey shows that practicing engineers are unfamiliar with timber structure modelling, and researchers generally lack resources for advanced modelling of timber systems. Furthermore, wood analysis and design modules currently implemented in a few structural analysis software are usually not suitable for complex or hybrid timber structures. This does not bode well given that performance-based design which is the future direction of building codes and material standards will rely even more on demonstrating the structural performance through computer modelling. In this project, a modelling guide for timber structures is being developed by FPInnovations with a global collaborative effort involving experts in various areas, with the aim of (a) assisting practicing engineers apply computer modelling to timber structures; (b) enriching researchers' resources for advanced computer modelling of timber systems; and (c) assisting software companies to identify the gaps and upgrade their programs accordingly to accommodate advanced computer modelling of timber structures.

Documents



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Forest fuel treatment productivity research in Alberta. A synthesis of results and findings

https://library.fpinnovations.ca/en/permalink/fpipub7993

Author:	Hvenegaard, Steven
Contributor:	Alberta Agriculture and Forestry
Date:	March 2021
Material Type:	Research report
Physical Description:	29 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Wildfire Operations
Subject:	Alberta Wildfires Forestry Fuel Productivity FPI TR
Series Number:	Technical Report ; TR 2021 n.11
Language:	English
Abstract:	Forest fuel treatments are applied across a broad range of ecosites in Alberta and Canada, with an overarching goal of managing hazardous fuel buildup to mitigate wildfire. These treatments use various manual and mechanical processes to achieve fuel treatment objectives. Planning and application of a specific forest fuel treatment technique is often shaped by several factors, including objectives of the fuel treatment, availability of resources (personnel and equipment), and commitment to using local resources (socio-economics). In addition, site conditions in certain ecosites will favour the application of some treatment techniques over others. With the broad nature of numerous fuel treatment techniques applied over a wide range of environmental conditions, it is difficult to document all treatments and develop comparative productivity and cost evaluations. This summary of fuel treatment studies accesses current research to present relevant findings and identify knowledge gaps in research on stand-level fuel treatment productivity.

Documents

Evaluation of the TV White Space telecommunication technology in forestry operations

https://library.fpinnovations.ca/en/permalink/fpipub7996

Author:	Tanguay-Laflèche, Maxime
Date:	March 2021
Material Type:	research report
Physical Description:	5 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Communications Forestry 4 0 Harvesting equipment Productivity Technology
Series Number:	InfoNote; 2021 n.7
Language:	English
Abstract:	Through the Forestry 4.0 program, FPInnovations is investigating and testing telecommunication technologies for the forestry industry, this includes the application of TV White Space (TVWS) technology. TVWS radios operate in the frequency spectrum between 450 to 698 MHz and the majority of this spectrum is unlicensed and not acquired through federal government auctions. A short-term field trial was conducted in Central Québec forest operations in December 2020. Cost-effective connectivity will bridge the gap between the forest and the rest of the supply chain. Operational efficiency, flexibility and worker safety will be improved by enabling instant communication with currently isolated logging operations. This report summarizes the findings and results obtained in this first operational trial aimed at quantifying the scope of mobile connectivity through this new technology.

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Évaluation de la technologie de télécommunication TV White Space en opération forestière

https://library.fpinnovations.ca/en/permalink/fpipub7997

Author:	Tanguay-Laflèche, Maxime
Date:	March 2021
Material Type:	research report
Physical Description:	5 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Communications Forestry 4 0 Harvesting equipment Productivity Technology
Series Number:	InfoNote; 2021 n.7
Language:	French
Abstract:	Par l'initiative Foresterie 4.0, FPInnovations trouve et met à l'essai des technologies de télécommunication pour l'industrie forestière tel que la technologie TV White Space (TVWS). Les radios TVWS opèrent dans le spectre de fréquence de 450 à 698 MHz et la majorité de ce spectre est non-licencié et pas acquis par l'entremise des enchères du gouvernement fédéral. Un essai sur le terrain à court terme a été réalisé dans une exploitation forestière du centre du Québec en décembre 2020. Une connectivité rentable comblera la division entre la forêt et le reste de la chaîne d'approvisionnement. L'efficacité opérationnelle, la flexibilité et la sécurité des travailleurs seront améliorées en permettant une communication instantanée avec les opérations d'exploitation forestière actuellement isolées. Ce rapport résume les constats et résultats obtenus lors de ce premier essai opérationnel visant à quantifier la portée d'une connectivité mobile grâce à cette nouvelle technologie.

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Seasonal flammability of forest fules. Implementing modified oxygen consumption calorimetry to estimate the flammability of black spruce and tamarck

https://library.fpinnovations.ca/en/permalink/fpipub8007

Author:	Refai, Razim
	Paskaluk, Stephen
	Hsieh, Rex
Contributor:	Alberta Agriculture and Forestry (AAF)
Date:	March 2021
Material Type:	Research report
Physical Description:	38 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Wildfire Operations
Subject:	Fire
	Black spruce
	Forest fires
	Fuels
	Tamarack
	Oxygen
	FPI TR
	Wildfires
Series Number:	Technical Report ; TR 2021 n.14
Language:	English
Abstract:	Modified oxygen consumption calorimetry was used to track the seasonal flammability of black spruce and tamarack. Age class related samples were collected for both species from May to September at research site in central Alberta. These samples were assessed for their differential heat release using test equipment at the Protective Clothing and Equipment Research Facility (PCERF) at the University of Alberta. The test method was able to successfully quantify the differences in seasonal flammability between black spruce and tamarack. Data showed the age-related flammability differences were less pronounced, with the exception of new growth samples early in the season.

Documents

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In-stand drop footprint mapping using S-61N helicopters

https://library.fpinnovations.ca/en/permalink/fpipub8010

Author:	Refai, Razim
	Hsieh, Rex
Date:	March 2021
Material Type:	Research report
Physical Description:	49 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Wildfire Operations
Subject:	Wildfires
	Helicopters
	Forestry
	Forest fire
	FPI TR
	Gel
Series Number:	Techncial Reports ; TR 2021 N 16
Language:	English
Abstract:	Alberta Agriculture and Forestry's (AAF) Wildfire Management Branch recently contracted two Sikorsky S-61N heavy helicopters. Both helicopters are equipped with an external tank (max. volume 1000 U.S. gallons) and have on-board injection systems that are capable of mixing class A foams and water-enhancers. Currently, there is limited data on comparative drop footprints of foam and water-enhancers (suppressants) for these heavy helicopters. To fill this knowledge gap, AAF has asked FPInnovations to conduct drop tests in different wildland fuel environments. This study focuses on mapping the drop footprints of water, foam, and water-enhancers in black spruce stands at specific flight parameters.

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Evaporation rates, assessing the evaporation rates of water, foam, and water-enhancers

https://library.fpinnovations.ca/en/permalink/fpipub8011

Author:	Refai, Razim
	Paskaluk, Stephen
Date:	March 2021
Material Type:	research report
Physical Description:	12 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Wildfire Operations
Subject:	Wildfires
	Forestry
	Forest fire
	FPI TR
	Gel
	Test methods
	Foam
Series Number:	Techncial Reports ; TR 2021 N 17
Language:	English
Abstract:	Reduced surface evaporation rates are marketed as a competitive advantage by water-enhancer manufacturers. In this report, a new test method is developed and applied to quantify the evaporation rates of various commercially available water-enhancer products in a controlled environment. These quantified evaporation rates were then compared to the evaporation rate of water which served as the benchmark.

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On-field drop footprint mapping using S-61N helicopters

https://library.fpinnovations.ca/en/permalink/fpipub8012

Author:	Refai, Razim
	Hsieh, Rex
Date:	March 2021
Material Type:	Research report
Physical Description:	38 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Wildfire Operations
Subject:	Wildfires
	Helicopters
	Forestry
	Forest fire
	FPI TR
	Gel
Series Number:	Techncial Reports ; TR 2021 N 18
Language:	English
Abstract:	Alberta Agriculture and Forestry's (AAF) Wildfire Management Branch has recently contracted two Sikorsky S-61N heavy helicopters. Both helicopters are equipped with an external tank (max. volume 1000 U.S. gallons) and have on-board injection systems that are capable of mixing class A foams and water-enhancers. Currently, there is limited data on comparative drop footprints of foam and water-enhancers (suppressants) for these heavy helicopters. To fill this knowledge gap, AAF has asked FPInnovations to conduct drop tests in different wildland fuel environments. This study focuses on mapping the drop footprints of water, foam, and water-enhancers in an open field at specific flight parameters.

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Recovery rates of suppressants from heavy helicopter drops

https://library.fpinnovations.ca/en/permalink/fpipub8013

Author:	Refai, Razim
	Hsieh, Rex
Date:	March 2021
Material Type:	Research Report
Physical Description:	16 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Wildfire Operations
Subject:	Wildfires
	Forestry
	Forest fire
	FPI TR
	Gel
	Test methods
	Foam
Series Number:	Techncial Reports ; TR 2021 N 19
Language:	English
Abstract:	In 2020, Alberta Agriculture and Forestry's (AAF) Wildfire Management Branch contracted two externally tanked heavy helicopters with on-board injection and mixing systems. The two heavy helicopters are Sikorsky S-61N helicopters with modified Isolair tanks, capable of dropping water, foam, and water-enhancers. Drop tests were conducted using these helicopters to understand the relative footprints of different suppressants. This study focuses on using drop footprint data to estimate recovery rates of water, foam, and water-enhancers in two scenarios – an open field and a forested stand. These estimates may provide a primarily understanding of how best different suppressants can be used for different applications.

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Outils d'aide à la récolte des peuplements affectés par la tordeuse des bourgeons de l'épinette (TBE)

https://library.fpinnovations.ca/en/permalink/fpipub8014

Author:	Mercier, Guyta
	Gaudreau, Jean-Philippe
Date:	January 2021
Material Type:	Pamphlet
Physical Description:	1 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Biomass
	Costs
	Economics
	Harvesting
	Mapping
	Residues
Series Number:	OT 280
Language:	French
Abstract:	Les forêts aff ectées par des épidémies d'insectes, en l'occurrence par la TBE, présentent une structure de peuplement hétérogène. Cela s'explique, entre autres, par le niveau de défoliation qui n'est pas nécessairement le même d'un arbre à l'autre. La récolte de ces peuplements engendre des coûts supplémentaires. Ceux-ci sont occasionnés par une perte de productivité des machines associée au temps supplémentaire requis pour produire un panier de produits répondant aux spécifi cations des usines. Par ailleurs, les récents développements en télédétection ont montré un grand potentiel pour réaliser des cartes précises et détaillées pouvant améliorer le processus de planifi cation et le déploiement d'opérations forestières. C'est dans ce contexte que des études ont été menées depuis 2014 sur la Côte-Nord. Elles ont permis de mesurer les pertes de productivité des machines et de développer une cartographie plus fi ne permettant de guider les opérateurs vers les endroits où la valeur des tiges assure la viabilité des opérations.

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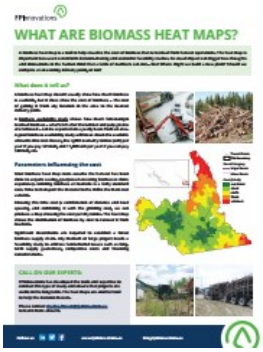

What are biomass heat maps?

https://library.fpinnovations.ca/en/permalink/fpipub8015

Author:	Friesen, Charles
Date:	January 2021
Material Type:	Pamphlet
Physical Description:	1 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Biomass
	Costs
	Economics
	Harvesting
	Mapping
	PIF
	Residues
Series Number:	OT 288
Language:	English
Abstract:	A biomass heat map is a tool to help visualize the cost of biomass that is residual from harvest operations. The heat map is important because it can inform decision-making and economic feasibility studies. Its visual impact can trigger new thoughts and innovations in the human mind that a table of numbers can not... like: Where might we build a new plant? Should we compete at an existing delivery point, or not?

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Services directory Forest Operations 2021-2022

https://library.fpinnovations.ca/en/permalink/fpipub8027

Author:	FPInnovations
Date:	March 2021
Material Type:	Pamphlet
Physical Description:	25 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Biomass Calculator DiagFor Diagnosis Drones Fiber supply Forest fires Forest operations FPInnovations Harvesting Indigneous forestry Machinery Roads Silviculture Soft soil Transportation Training Trucks
Series Number:	Pamphlet ; 2021
Language:	English
Abstract:	The services offered related to forest operations are outlined in this general brochure. Information on workshops, professional services, virtual library, online tools and opportunities for assessment and support are detailed.

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Catalogue de services Opérations forestières 2021-2022

https://library.fpinnovations.ca/en/permalink/fpipub8028

Author:	FPInnovations
Date:	Mars2021
Material Type:	Pamphlet
Physical Description:	25 p.
Sector:	Forest Operations
Field:	Fibre Supply
Research Area:	Forestry
Subject:	Biomass Calculator DiagFor Diagnosis Drones Fiber supply Forest fires Forest operations FPInnovations Harvesting Indigneous forestry Machinery Roads Silviculture Soft soil Transportation Training Trucks
Series Number:	Pamphlet ; 2021
Language:	French
Abstract:	Les services offerts liés aux opérations forestières sont décrit dans cette brochure. Les informations sur les ateliers, les services professionnels, la bibliothèque virtuelle, les outils en ligne et les possibilitées d'interventions sont détaillées.

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Développement de murs de cisaillement à haute capacité pour la construction à ossature en bois

https://library.fpinnovations.ca/en/permalink/fpipub8030

Author:	Ni, Chun
Date:	March 2021
Material Type:	Research report
Physical Description:	5 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Building Systems
Subject:	Wood structure
	Shear walls
	Walls
	Wood
	Building construction
Series Number:	InfoNotes 2021 N14
Language:	French
Abstract:	n collaboration avec l'Université de Victoria, on a mis au point un mur de cisaillement à haute capacité comportant deux rangées de clous au périmètre du revêtement. On a mené un programme d'essais pour évaluer la performance du mur de cisaillement proposé, ce qui comprend la résistance aux charges latérales et aux déplacements, le comportement hystérétique, la rigidité et la ductilité.

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Modelling of mass timber seismic force resisting systems

https://library.fpinnovations.ca/en/permalink/fpipub8031

Author:	Chen, Zhiyong
	Popovski, Marjan
Date:	March 2021
Material Type:	Research report
Physical Description:	6 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Building Systems
Subject:	Cross Laminated Timber (CLT)
	Performance
	Building construction
	Building materials
	Seismic
Series Number:	InfoNote 2021 N6
Language:	English
Abstract:	This InfoNote briefly introduces the promising MT SFRSs, and the corresponding analytical and finite element models to support their adoptions in structural design offices.

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Systèmes de résistance aux forces sismiques en bois massif dans les codes et les norme au Canada

https://library.fpinnovations.ca/en/permalink/fpipub8032

Author:	Chen, Zhiyong
	Popovski, Marjan
Date:	Mars 2021
Material Type:	Research report
Physical Description:	5 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Building Systems
Subject:	Cross Laminated Timber (CLT)
	Performance
	Building construction
	Building materials
	Seismic
Series Number:	InfoNote 2021 N6
Language:	French
Abstract:	La présente InfoNote décrit brièvement les systèmes de résistance aux forces sismiques (SRFS) en bois massif qui seront inclus dans l'édition 2020 du Code national du bâtiment (CNB) du Canada, leurs limites de hauteur et les principales exigences de conception selon la norme Règles de calcul des charpentes en bois de l'Association canadienne de normalisation CSA O86-19. Elle explique aussi les différences de limite de hauteur entre les différents systèmes de résistance aux charges de gravité et aux charges latérales.

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Modélisation des systèmes de résistance aux forces sismiques

https://library.fpinnovations.ca/en/permalink/fpipub8033

Author:	Chen, Zhiyong
	Popovski, Marjan
Date:	Mars 2021
Material Type:	Research report
Physical Description:	7 p.
Sector:	Wood Products
Field:	Sustainable Construction
Research Area:	Building Systems
Subject:	Cross Laminated Timber (CLT)
	Performance
	Building construction
	Building materials
	Seismic
Series Number:	InfoNote 2021 N6
Language:	French
Abstract:	La présente InfoNote décrit brièvement les SRFS en bois massif prometteurs, de même que les modèles analytiques et par éléments finis correspondants dans le but d'encourager leur adoption par les entreprises de conception structurale.

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