Quesnel Forestry Think-Tank

May 3, 2023

OVERVIEW

Introduction to West Fraser

LignoForce process and Amallin use in Plywood

- Amallin production
- Amallin properties
- General overview from West Fraser perspective
- Phenol-formaldehyde replacement in plywood

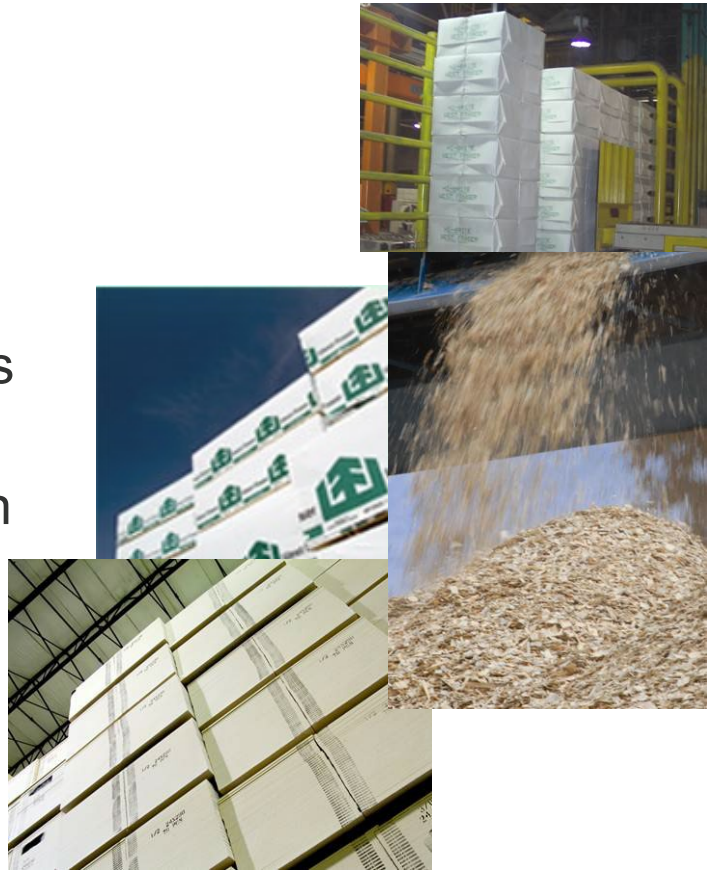
Propel

- Review of composition
- Applications

About West Fraser

An integrated solid forest products company primarily focused on wood products.

- Founded in 1955 in Quesnel, BC.
- Core business is producing lumber, engineered wood products (OSB, laminated veneer lumber (LVL), MDF, plywood), pulp and newsprint, biomass residuals and renewable energy.
- 10,000+ employees in 63 operations in Western Canada, across the Southern United States, EU and UK.
- North America's largest lumber producer.



West Fraser Operations

☆ CORPORATE OFFICES

● LUMBER

Canada
1. Quesnel
2. Williams Lake
3. Smithers
4. Chetwynd
5. Fraser Lake
6. 100 Mile House
7. Blue Ridge
8. Hinton
9. Edson
10. Sundre
11. High Prairie
12. Manning

U.S.
13. Joyce
14. Huttig
15. Henderson
16. New Boston
17. Leola
18. Mansfield
19. Russellville
20. Maplesville
21. Opelika
22. McDavid
23. Perry
24. Lake Butler
25. Maxville
26. Whitehouse
27. Blackshear
28. Fitzgerald
29. Dudley
30. Augusta
31. Newberry
32. Armour
33. Seaboard
34. Angelina

▲ PULP & NEWSPRINT
35. Hinton (NBSK)
36. Quesnel (NBSK)
37. Quesnel (BCTMP)
38. Slave Lake (BCTMP)
39. Whitecourt (newsprint)

ENGINEERED WOOD

PLYWOOD
40. Edmonton
41. Quesnel
42. Williams Lake

MDF, PARTICLEBOARD & FURNITURE

Canada
43. Blue Ridge (MDF)
44. Quesnel (MDF)

U.K.
45. Cowie, Scotland (PB & MDF)
46. South Molton, England (PB & furniture)

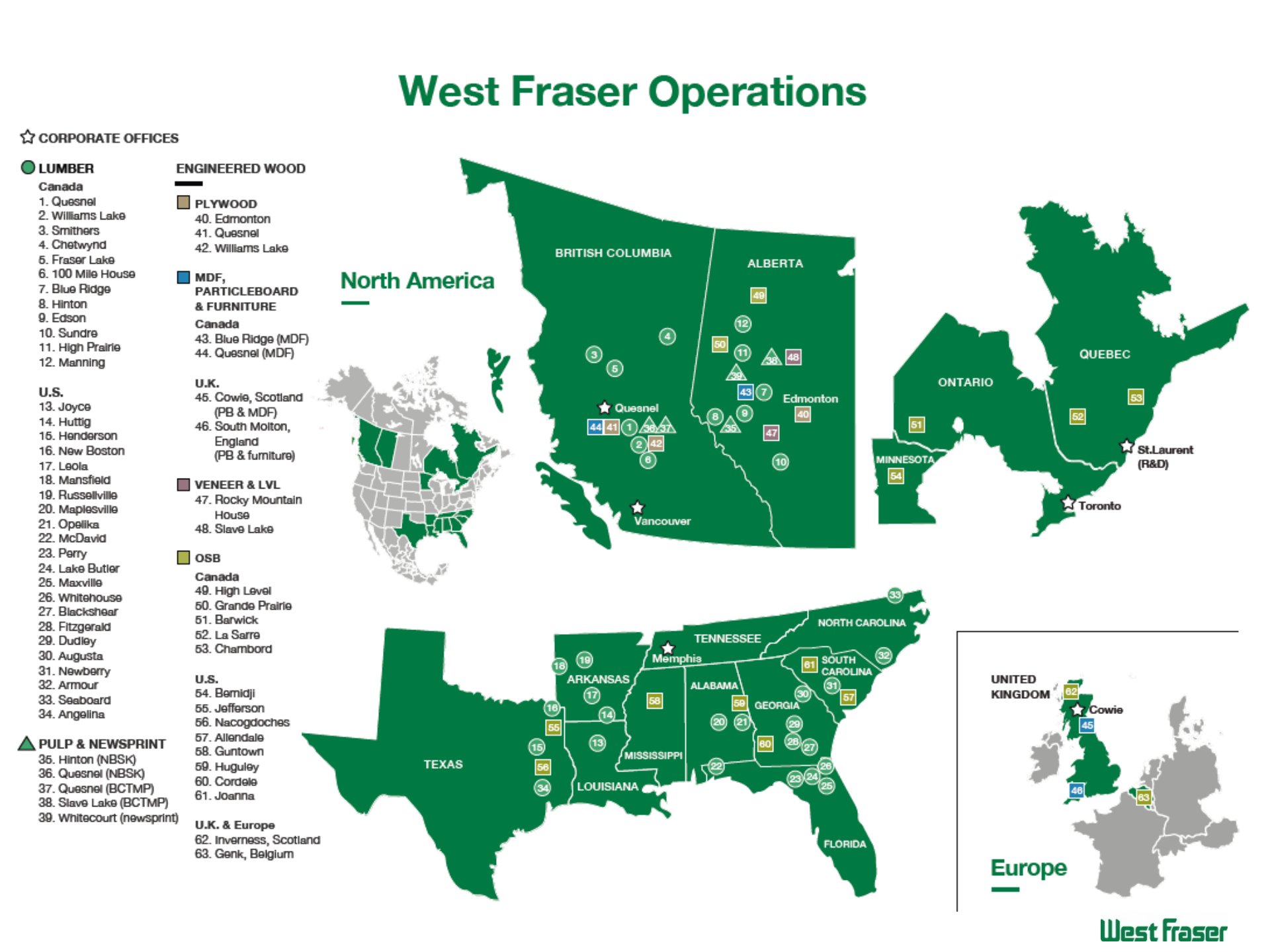
VENEER & LVL
47. Rocky Mountain House
48. Slave Lake

OSB

Canada
49. High Level
50. Grande Prairie
51. Barwick
52. La Sarre
53. Chambord

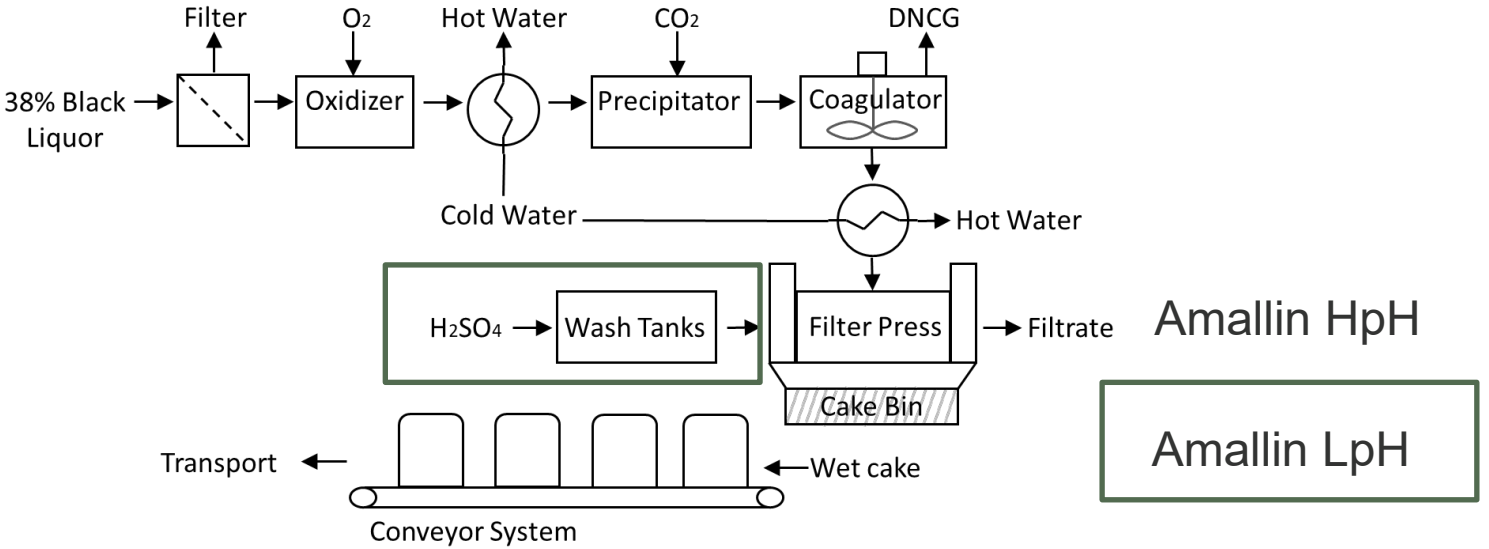
U.S.
54. Bemidji
55. Jefferson
56. Nacogdoches
57. Allendale
58. Guntown
59. Huguley
60. Cordele
61. Joanna

U.K. & Europe
62. Inverness, Scotland
63. Genk, Belgium



West Fraser

LignoForce™ at Hinton (AB)



Amallin HPH

Property	Units	Result
pH	15% slurry in DI water	10.1
Ash	% Ash solid	15.0
Solids	% Dry solid (analytical method)	60.0

Amallin LPH

Property	Units	Result
pH	15% slurry in DI water	3.0
Ash	% Ash solid	0.5
Solids	% Dry solid (analytical method)	60.0

AMALLIN TRIALS AS PF REPLACEMENT

- **Successful commercialization is ongoing using Amallin.**

REVIEW

- Amallin separation was a large optimization exercise, such as its implementation in plywood glue.
- Various applications, maybe LRP process modifications allow for even more.
- Advantages for the mill, recovery boiler limitation minimized, fiber availability is of course necessary.
- Expansion only planned once markets are ready (next lignin plant), supply chain partners are signed etc.
- Initial LCA so far proves to be GHG negative, at least in the asphalt application.

General Propel Information

What is the product?

- Cellulose Reinforced Plastic Composite. Cellulose is dispersed in a PP/PVC/PE matrix at load levels suitable for compounding, injection molding and extrusion applications.
- Currently, a material with limited sustainable attributes; however, Propel with fully biodegradable plastic components are under development

Basic Product composition

- Pulp
- Additives
- Virgin plastics

Product Forms

1. Cellulose Masterbatch.

- 85% active cellulose level
- Suitable for addition into PP, PVC, PE
- Readily dispersible using conventional compounding techniques.

2. Cellulose Letdowns

- 10%, 20%, 30%, 40% active cellulose level.
- Currently available in PVC, PP, HDPE, TPO
- Ready for direct molding or extrusion.

Compelling Value Proposition:

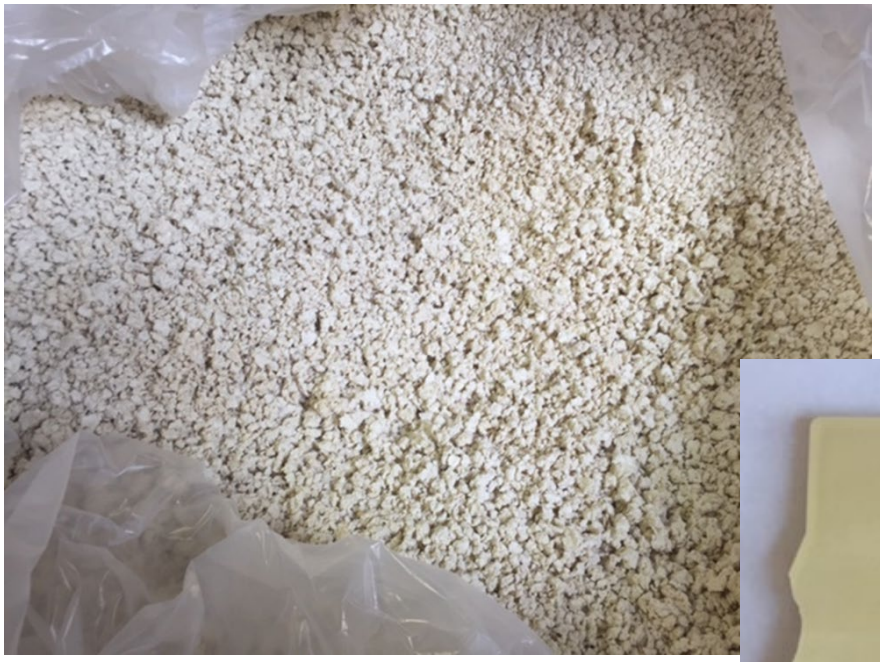
Key Differentiators of WF Composite

1. Better mechanical properties vs incumbents
2. Properties are more isotropic
3. Excellent processing characteristics
    - Significantly faster machine press times in multiple applications tested
4. Lower part mass (“light-weighting”)
5. Price/Value
    - Competitive with glass-filled PP

Other Potential Benefits Over Alternative Materials

Glass Reinforced Composites	Filled/Unfilled Plastic Compounds
Improved molding cycle time.	Higher modulus.
Reduced mass.	Superior mold flow in large parts.
Weight savings on finished parts.	Fast filling of molds.
Can reduce energy requirements.	Improved chemical resistance.
Less abrasive, reduced wear and tear on equipment.	Lower wall thickness.

PROPEL FOR END-USERS

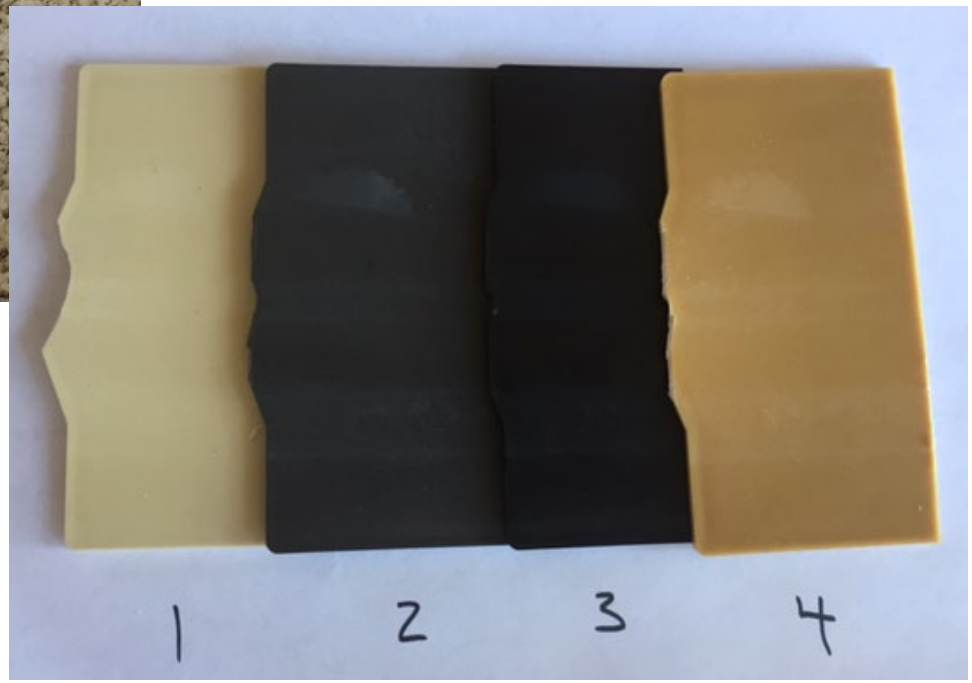


Propel 70:30 (MB:PP)

Sheet production with Propel 70:30

- 43 % final BCTMP content

1. TiO_2 (colour)
2. Dye
3. Dye + mineral oil
4. Only extra PP



REVIEW

Propel is a proprietary cellulose filled plastic

Currently available compounded materials include PVC, PE and PP

Development ongoing with fully biodegradable plastics

Material properties are optimized for usual plastics processing equipment and end-use applications

Value is competitive for direct replacement

THANK YOU!

Thank you!

Matyas Kosa, PhD
Bioproducts Lead
West Fraser

Matyas.Kosa@westfraser.com