Getting it Right - Cost, Quality and Sustainability Opportunities using British Columbia NSK

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Who We Are

• 2nd largest global producer of softwood lumber
• Fourth largest producer of NSK worldwide, largest in North America
• Three pulp mills in the interior of BC Canada
• Innovation Center with state of the art measuring equipment
• Company with a strong reputation for quality, customer service and excellence in logistics support
• Top performer, anchored by an exceptional balance sheet
Our Operations

**MILL/LOCATION**
1. Intercontinental
2. Northwood
3. Prince George Pulp & Paper
4. Vancouver
5. Canfor Pulp Innovation R&D Centre - Vancouver

**KEY PRODUCTS**
- Intercontinental: NBSK Pulp
- Northwood: NBSK Pulp
- Prince George Pulp & Paper: NSK Pulp
- Prince George Pulp & Paper: Kraft Paper
- Vancouver: Head Office

**Fibre Supply Area**
- 800 km

*Canfor Pulp Products Inc.*
Strategic Advantage: Proximity of Mills

Northwood

Intercon

Prince George
Canfor Pulp has an annual capacity of 950 kt of NBSK and 150 kt of UBK/SBK.
Typical Fibre Dimensions
Not all Softwood Kraft Pulps are the Same

Wall thickness in microns

Fibre diameter in microns

Fibre length in millimetres

"Weight weighted lengths measured by Kajaani FS200"
BC Interior Spruce/Pine
Cross Section of one Annual Ring
Premium Reinforcement Pulp
The Ability to Collapse

Northern spruce and pine fibre grown in the central interior of British Columbia are recognized as one of the strongest in the world due their ability to collapse easily.
### Fiber Morphology and Properties

**European NBSK and Radiata Pine vs. Canfor IC 90 (all unrefined)**

<table>
<thead>
<tr>
<th>Pulp</th>
<th>Freeness/SR value</th>
<th>Coarseness</th>
<th>Fiber length l-w</th>
<th>Fines l-w</th>
<th>Beaking length</th>
<th>Wet zero span</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSF (mg/100 m)</td>
<td>SR (mm)</td>
<td></td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiata Pine</td>
<td>681</td>
<td>16,0</td>
<td>16,4</td>
<td>2,29</td>
<td>2,68</td>
<td>2,81</td>
</tr>
<tr>
<td>Scandinavian</td>
<td>684</td>
<td>16,0</td>
<td>13,9</td>
<td>2,12</td>
<td>5,12</td>
<td>2,68</td>
</tr>
<tr>
<td>Central European - Tensile optimized</td>
<td>687</td>
<td>15,5</td>
<td>13,2</td>
<td>2,34</td>
<td>4,90</td>
<td>3,11</td>
</tr>
<tr>
<td>Eastern European</td>
<td>626</td>
<td>18,0</td>
<td>12,3</td>
<td>2,23</td>
<td>3,75</td>
<td>2,87</td>
</tr>
<tr>
<td>Canfor IC 90</td>
<td>677</td>
<td>16,0</td>
<td>13,4</td>
<td>2,51</td>
<td>2,03</td>
<td>4,00</td>
</tr>
</tbody>
</table>

There are significant differences
Comparison of different Bleached Softwood Kraft Pulps

Breaking Length as a Function of Net Specific Refining Energy

- Radiata Pine
- Eastern European
- Scandinavian
- Central European - tensile optimized
- Canfor IC90

Net specific refining energy [kWh/t]

Breaking length [km]
Canfor Pulp is the only Canadian NBSK pulp producer, and one of the few globally, with a dedicated research facility.

“Innovation is the creation and delivery of new customer value in the marketplace that also provides sustainable return to the enterprise”

Four key areas of focus
- Cost Reduction
- PRP Strength & Quality
- Tissue USP
- New Products for PRP
Search and Apply
NOT
Research and Development
$9.5 million capital investment representing 20 individual projects
- Implemented in January 2011, and expected to be fully operational late in 2013
- State-of-the-art analytical technologies and one specialized software
- Three unique mill facilities and our innovation centre joined as one sophisticated, real-time monitoring system

A product enhancer, a competitive differentiator
Canfor Pulp Innovation established a refining procedure more than ten years ago using an industrial disk refiner working according to the bar-to-bar principle.

Results can be directly transferred to the industrial refining process (unlike data from laboratory equipment such as PFI or Jokro mill).

Canfor’s refining expertise is unique amongst NBSK producers.
TEMAP – Solving the Fibre Puzzle

Teaming Toward Optimization and Maximum Technical Value

- Technical Marketing Program
- Leveraging 40 years of experience
- Technical collaboration - on site
- Improved product performance
- Optimizing our pulp’s value
- Insights into PRP
- Premium Reinforcing Pulps
- www.Temap.com
- Web-based technical platform
Sustainable Enterprise at Canfor Pulp

Key Stakeholders
- Employees
- Customers
- Shareholders
- Community
- Fibre Supply chain
- Other Stakeholders

Areas of Focus
- Economic
- Social
- Environmental

Transparency
Some of the Main Issues We Consider

- Legal sourcing of wood
- Biodiversity
- Sustainable Forest Management (certification)
- Efficient resource use (water, fibre, energy)
- Emissions to water, air and land
- Carbon footprint
- Societal impacts (safety, work and living environment)
- Security of employment
Tools We Use to Assist Our Sustainability Thinking

Transparency
- Forest Certification (CSA, PEFC and FSC CW)
- Sustainable Product Declarations

Robust Systems
- ISO9000 and 14000

Eco-efficiency and Innovation
- Life cycle Assessment
- Industrial Ecology – “Science of Sustainability”
- Design for Environment (DfE)
The Sustainable Development Ecosystem

The Ecosystem

Ecosystem services

Clean air
Pure water
Affordable energy
Pleasurable habitat
Biodiversity

Return on investment
Investment in Services

The Economy

Source: IFTF
Two Decades Ago, BC was Known for Conflict in the Forest

Only 2% of the Coastal Temperate rainforest was protected

The planning process was happening while key ecological areas were vulnerable to development.

Timber was the primary management focus.

Conflict and controversy were the result.
The Joint Solutions Project and The Great Bear Rainforest Agreement

For a full description of the process, visit:
http://www.greenpeace.org/international/Global/international/Code/2012/greatbearrainforest/gbr.html
Recognition by WWF “Gift to the Earth Certificate” - CFCI
Boreal forest represents approximately 75% of Canada’s forest.
Influencers: The ENGO Community and Our Customers

ENGOs have been a force for positive change in the forest sector.
- The campaign → collaborate → solution model that we have seen recently, has worked. It can be almost dialectic in nature.
- Where change is needed, ENGO’s can be a powerful inside/outside force, they are not confined by policy.
- When solutions are being worked on there are very real incentives for all parties to remain engaged.
- Durable solutions require broad-based support and ENGO’s are part of this.

Through all of this we have of course been talking with Customers and their Customers. We measure and learn from them.
- We learned important lessons from many, we taught some lessons to a few. This process continues today – new customers, new lessons.
- The key question we have learned to ask is “Will my pulp be good for my customers and their customers, or not?” Not just its technical properties – but also safety, value, environmental properties…
Global Chemical Market Pulp Demand 2012: 53.6 Mt

- The UBK segment accounts for less than 4% of the world chemical pulp demand.
- 45% are based on Northern Softwood Kraft

Source: PPPC
# UBK Market Pulp
## Capacity and Production by Region, 000s tonnes

<table>
<thead>
<tr>
<th>Region</th>
<th>Capacity 2012</th>
<th>Estimated Production 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>460</td>
<td>420</td>
</tr>
<tr>
<td>Nordic/Western Europe</td>
<td>165</td>
<td>155</td>
</tr>
<tr>
<td>Eastern Europe*</td>
<td>555</td>
<td>515</td>
</tr>
<tr>
<td>Latin America</td>
<td>450</td>
<td>440</td>
</tr>
<tr>
<td>Japan</td>
<td>285</td>
<td>270</td>
</tr>
<tr>
<td>Oceania</td>
<td>120</td>
<td>110</td>
</tr>
</tbody>
</table>

* Solombalsky (Russia) has recently shut removing 200 kt from the market.

Source: PPPC, Canfor Pulp
UBK Market Pulp

Comments

➢ Electrical applications and fiber cement account for approx. 35% of the total demand. The remaining two thirds are used for the production of other specialty and paper grades.

➢ The packaging market may fuel demand for UBK in order to offer „Kraft“ like testliner and to compensate diminishing strength of recovered paper furnish. Printability becomes another important criteria.

➢ In general, capacities with integrated paper production do not provide secure supply.

➢ Campaigning UBK, as practiced by some producers depending on market conditions, will not meet requirements of specialty paper producers with respect to high quality, consistency and secure supply.

The market dynamics for UBK are quite different from the bleached one. Limited number of suppliers can meet highest quality specifications consistently.
**Application – Case Study #1**

**Background**
Product: Teabag paper, 12 - 16 g/m²  
Furnish: Abaca + small amount of NBSK

**Objective**
Increase amount of NBSK

**Trial design**
- Refining of pure pulps and blends  
and hand sheet making

**Conclusion**
- Canfor pulp can be added up to 25%  
with minor or no impact on strength.  
- Further improvements are expected by  
a tailor-made refining strategy

**Graph:**
- 100% Abaca
- 100% IC90
- 85% Abaca/15% IC90
- 75% Abaca/25% IC90

- **Net specific refining energy [kWh/t]**
  - 0 25 50 75 100 125 150
  - Breaking length [km]
  - 3 4 5 6 7 8 9 10 11 12 13

Canfor Pulp Products Inc.
Application – Case Study #2

Background
Product: Wall cover, 60 up to 120 g/m²
Furnish: 70% BSK (unrefined)/30% PES fibers

Objective
Investigate the strength potential of different BSK

Trial Design
Sheet forming and drying on Andritz pilot machine
Application – Case Study #2

**Conclusion**
- Using Canfor IC 90 gives superior strength
- Tailor made refining will activate further potential

Sheet cross section: PES fibers and collapsed fibers (IC 90)
Application – Case Study #3

Background
Product: One side coated label paper, 57 g/m²
Furnish: 55% NBSK/45% Bagasse (unrefined)

- Need to refine NBSK to 400 CSF for strength requirements
- Further refining desired but limited by paper machine drying capacity

Objective
Reduce amount of NBSK and improve strength properties of final product

Trial design
- Refining and hand sheet making from blends

![Graph showing the relationship between Breaking length [km] and Freeness [CSF]].
Conclusion

- Refining Canfor IC 90 to 430 CSF will give strength already at a 35% addition.
- Staying with a 55% addition will result in a strength increase of 10%.
- Potential to use less refining and still reduce NBSK content by 10 percent points.
Canfor Pulp is highly diversified by region and end use

The morphology of our fibers and the resultant ability to collapse easily makes them a premium reinforcement pulp

We strongly believe in the technical fit approach

Innovation is a key pillar of our strategy and a competitive differentiator

Our refining expertise is the important link between our fibers and our customers’ products

Sustainability thinking and conduct are essential in today’s market place

Canfor Pulp is a reliable and high quality supplier to the unbleached sector of the specialty paper market