




Innovation in the Forest Products Industry

AMEC – Forest Industry Consulting, Vancouver, Canada





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The often unspoken goal is to solve a problem or capitalize on an opportunity.


- Innovation must increase value, customer value, or producer value, or both. The succession of many innovations grows the whole economy.
- The term innovation may refer to both radical and significant incremental changes to products, processes or services.
 - The uncertainty of breakthrough innovations means that seldom do companies achieve their breakthrough goals this way, but those times that breakthrough innovation does work, the rewards can be tremendous.
- Most research has been devoted to the technology, or has otherwise taken a how to approach.
- The integrated innovation model, viewing the entire supply chain, provides an intuitive understanding of the innovation.
 - Therefore, innovation can take many forms: Business model; Marketing; Organization; Process and Product (technology); Service; Supply; and Financial

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What drives innovation?


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Necessity (scarcity) is the mother of all invention (innovation)....

- Refrigeration – monopoly of ice supply from the US Northeast for consumers in the US Southeast.
- British Empire – monopoly of sugar cane from the West Indies for consumers in continental Europe – to this day, West Germany is self sufficient in sugar based on sugar beets.
- The economic scarcity of cotton linters, reeds, and building materials (bricks and mortar) in the New World gave rise to the modern forest products industry:
 - Lumber and panel products for housing; and
 - Wood fibre for pulp and paper making.

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What to avoid and remember

- The "Low Cost" trap - low cost is not an indefinite, sustainable, comparative advantage (Michael Porter, Competitiveness of Nations)
- The Edison Gap (Francis McInerney, MD of North River Ventures)
 - Edison's, most important innovation was the centralized research and development model used by industry for over a century
 - A model that doesn't work today in today's world of high speed information
 - The Gap is when R&D costs run ahead of earnings
- Technological Lock In – he who gets to market quickest and biggest wins, not necessarily the best technology:
 - VHS versus Beta versus;
 - Windows versus MAC;
 - Blue Ray versus HD-DVD.

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Does this industry innovate?

A brief history of development

Time Frame	Driver	Industry Reaction
15th and 16th Centuries	Religion – the Bible for the masses, Gutenberg Press	Wide spread adoption of paper rather than parchment which was unsuitable for the printing press. First mechanized sawmills based on a pitman arm attached to a water wheel or wind mill.
17th and 18th Centuries	Lack of fibres – e.g. cotton linters, papyrus, reeds, etc. and building materials (bricks and mortar) in the New World	Development of technology to use trees. Circular saw blade developed.
18th and 19th Centuries	Politics and socio-economic developments – the commoditization of politics (democratization) of societies, industrialization, steam power	Mechanized lumber manufacturing. Development of the steam driven Fourdrinier paper machine. Mechanical wood pulping developed - stone groundwood.
19th and 20 Centuries	Industrialization – education, rising standards of living, emergence of the middle class	Emergence of platform housing construction methods and structural panels (plywood). Emergence of chemical pulping – sulphite process.
20th Century	Two world wars. Mass communication. Mass movement of goods.	Emergence of the closed cycle chemical pulping - sulphate process. Emergence of different papers for different end-uses – faster machines, better quality, lower cost. Corrugated boxes
20th and 21st Centuries	Rapid and prolific technological development in the 20th century	Engineered wood products, engineered papers, use of multiple materials (foils, resins, coatings, etc.)

Market linkages leading to innovation in this industry have recently been reactions to competitive threats ...

- Steel in home construction – engineered wood products such as LVL and OSB leading to I-joists, engineered trusses, etc.
- Distribution and logistics innovation in the retail business (WAL*MART) lead to RPC's (returnable plastic crates) – corrugated box industry develops standard sized boxes, ways to eliminate wax as a coating to make the boxes more recyclable
- Plastics in consumer packaging – low cost LDPE and HDPE almost completely wiped out paper bags, will Tyvek do the same to paper sacks?



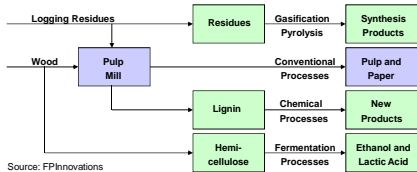
Genetic research and development of hybrids and clones

- Eucalyptus
 - primarily in South America although increasing interest in other parts of the world such as China and Africa
- Over the past several decades growth rates have doubled from about 25 m³/ha/year to 50 m³/ha/year
- More efficient use of land and enabling the viability of preserving and planting of native species
- Ability to tailor the characteristics of the fibre for the end use



Biorefining

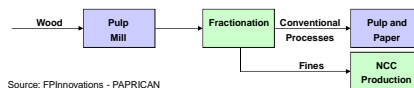
- An integrated suite of processes utilizing existing pulp and paper mills
- Multiple products from a single site:
 - Fuel
 - Specialty chemicals
 - Commodity chemicals
 - Plastic precursors
- Feedstock is biological and renewable rather than petroleum based



Source: FPInnovations

Nanotechnology – nano-crystalline-cellulose properties and potential applications

- Optical properties
 - Security papers
 - Iridescent pigments
 - Cosmetics
 - Paint additive
- High Surface Area
 - Catalyst substrates
 - Coating formulation
 - Retention aids
- Strength
 - Paper and packaging
 - Textiles
 - Composite materials
- Self-assembly
 - Barrier layers
 - Gels
 - Reinforcement layers
 - Switchable optical films


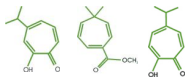


Source: FPInnovations - PAPRICAN

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Biotechnology – chemicals derived from trees

- Pharmaceuticals (antibiotic, antitumor, antiviral, antifungal)
- Cosmetics
- Flavors & Fragrances
- Pest repellents & insecticides
- Nutraceuticals



Source: Xylon Biotechnologies Ltd.

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Engineered wood products

- I joists
- Laminated Veneer Lumber (LVL)
- Oriented Strand Board (OSB)
- Laminated Strand Lumber (LSL)
- Most of which improved the utilization of trees and allowed for the utilization of previously unused species such as Aspen

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Renewable energy

- Small-scale biomass gasification
- Inside-the-fence heat and/or power
- Simple and commercially proven
- Clean, low emissions & versatile




Source: Nexterra Energy Corp

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What is on the horizon?

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What are the drivers of the future ...

- The rebalancing of world foreign reserves, diversifying away from the US Dollar as the world reserve currency, and the current liquidity crises, perhaps spreading to a solvency crises
- Environmental awareness and concerns
- Competing land uses
- Energy availability and cost
- Information transparency and collaboration
- Looming softwood fibre supply shortage
- Near term hardwood fibre supply constraints

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Where, how, and with whom can we collaborate with? Models for success

- FPIInnovations
 - Paprican – Pulp and Paper Research Institute of Canada
 - Cellulosic products orientation
 - Forintek – Forest Products Institute of Technology
 - Structural building materials oriented
 - FERIC – Forestry Engineering Research Institute of Canada
 - Harvesting and silviculture focus
- Alberta Research Council
 - Focused on a core competency centered around the oil and gas industry
 - Using its lesson's learned to exploit this knowledge with other research institutes – e.g. FPIInnovations group in Canada
 - Initial focus on bio-mass energy and process control

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What should South America do?

- Do you want to be the masters of your destiny?
 - Example of what happened to a significant proportion of the North American industry
 - Declining cost competitive position
 - Increasing capital intensity
 - Increasing commoditization of products
 - Declining earnings and margins
 - Financial community has taken over and disintegrating and dismantling long standing companies

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Who is AMEC and what do we do

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AMEC Overview

AMEC is a global leader in the provision of services and engineering solutions to the world's infrastructure, manufacturing and process industries





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AMEC Overview Key Company Data

- Publicly-held UK company
- Market capitalization of approximately US \$1 billion
- Significant operations in Europe, North and South America, Asia and Australia
- AMEC has annual revenues in excess of US \$6.0 billion (2007) and 16,000 people in offices in more than 40 countries

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AMEC Forest Industry Consulting – committed to clients' competitive advantage

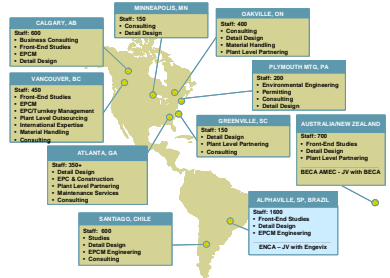
- Strategic planning
- Asset management
- Investment analysis
- Environment and technology
- Fibre resources
- Asset optimization
- Markets and marketing
- Due diligence
- Feasibility studies
- Economics
- Logistics and distribution
- Dispute resolution



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~ 5000 Staff



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