

Road Map Summary



Value
to
Wood

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Challenges and Opportunities for Millwork and Architectural Woodwork Manufacturers



Photo: www.bcforestinformation.com

This sector as defined by Statistics Canada (NAICS 321919) comprises many varied wood products including wood flooring, and wood windows and doors (which are subjects of companion reports). In this report, products include mouldings, components and prefabricated stairways/staircases. A team of researchers interviewed Canadian manufacturers for their vision of their industry and the innovation needed to support its continued health. The team then consulted key university and Forintek researchers to review the challenges facing the industry and to brainstorm for additional innovations. The information presented in this report is part of a larger work "Roadmap for the Canadian Value-added Industry" available from FPInnovations – Forintek Division.

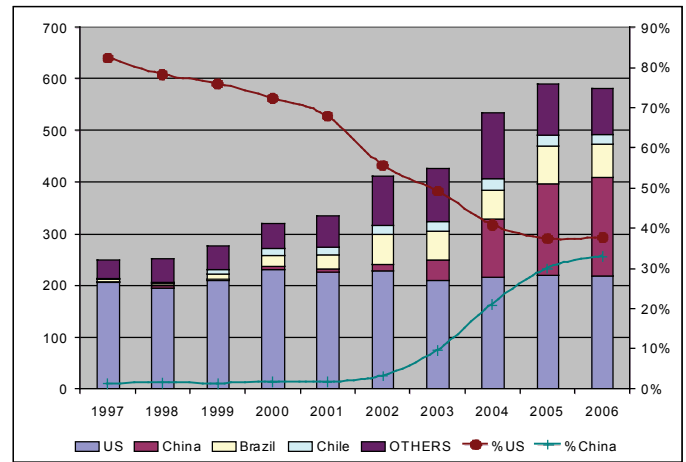


Natural Resources
Canada

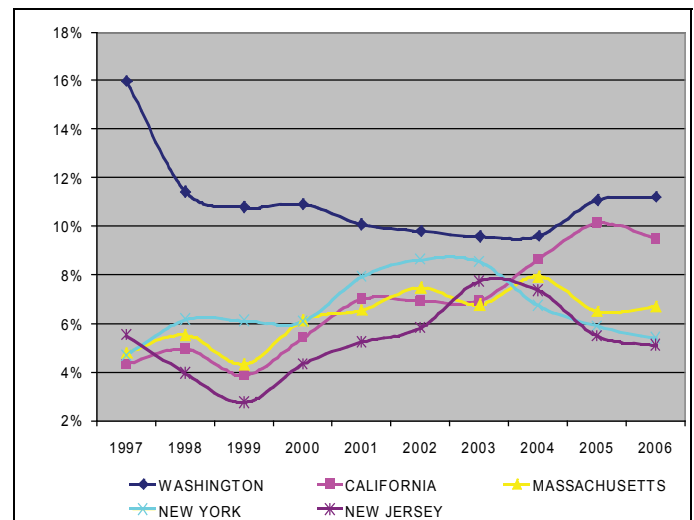
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The Millwork and Architectural Woodwork Industry At-a-Glance

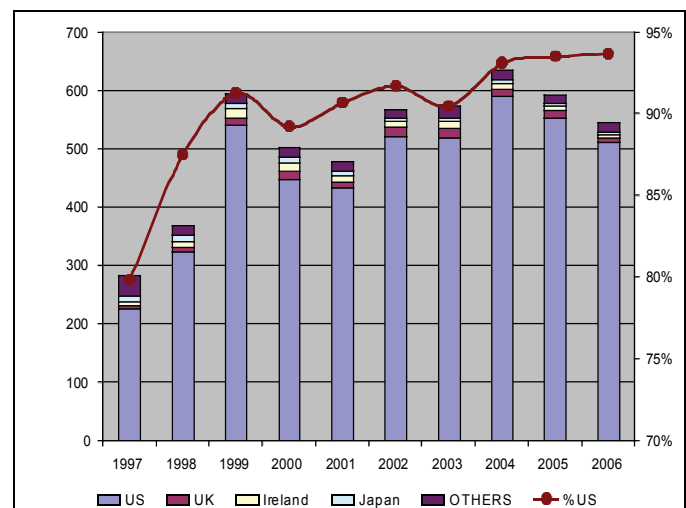
- Canadian shipments of millwork products totalled \$3.5 billion and apparent consumption (shipments within Canada plus imports) was estimated at \$3.5 billion in 2003.
- The Canadian trade balance is in quasi-equilibrium with about 15% of its shipments being exported and imported every year. The Canadian millwork industry's main trading partner is the US.
- This situation is slowly changing as newly emerging economies are strengthening their presence in world markets. In particular, Chinese millwork producers now account for 30% of Canadian imports; in 2001, they barely represented 2% of Canadian imports.
- Imports to Canada from China have grown at a compound annual growth rate of 90% since 1996.
- In contrast the US market share of imports to Canada have gone from 85% in 1996 (\$165M) to about 38% in 2006 (\$221M).
- Most Canadian millwork products exported are sent to the US—close to 95% of all exports in 2005.
- Canadian exports of millwork originate mostly from Quebec (41%), followed by British Columbia (27%) and Ontario (25%).



Origin of Canadian millwork product imports (in \$ millions).
Source: Industry Canada, 2007.



Destination states of Canadian millwork products.
Source: Industry Canada, 2007.



Destination of Canadian exports and % exports sent to the US (in \$ millions). Source: Industry Canada, 2007.

Industry Vision and Driving Forces

Newly Emerging Economies

Foreign manufacturers of commodity products (e.g., lumber, particleboard, MDF, etc.) are increasingly exporting their products into markets traditionally supplied by Canadian industries. The emergence of these economies, coupled with a weak US dollar, forces Canadian manufacturers to target different market segments or offer additional service attributes to differentiate their products from those coming from countries with low manufacturing costs.

According to manufacturers...

- The current high Canadian dollar is making the US less attractive for the millwork industry. Bidding on Canadian projects has become highly competitive as companies focus on domestic opportunities.
- Even though millwork is a very custom based business, Chinese products are starting to show up in Canadian companies' markets. China is producing the high volume repeating elements that are part of new projects.
- There have been reports of offshore competition in laminated oak stair treads, therefore, the size of individual custom millwork orders is going down.
- The millwork industry is considered to be a high development potential industry because domestic manufacturers can provide unique products faster than overseas producers (focus on service attributes).
- Outsourcing components from Asia and South America is a strong trend in the millwork industry. Various strategies are used against this competition; some companies are forging alliances with Chinese companies, others will offer custom products that can be delivered quickly.

Resource Issues (supply and characterization)

Aside from the decision to change species for financial reasons, many appearance wood products' manufacturers are being forced to adjust their materials and grades mix because their historical raw material supply has changed in quality and/or price, thus influencing their ability to deliver the same products. This situation presents multiple challenges and opportunities.

According to manufacturers...

- The millwork industry is dealing with various quality, availability and cost issues that are related to fibre supply:
 - Decreasing quality of wood.
 - Exotic species such as mahogany and walnut are difficult to obtain given the demand for these products. Fire-rated wood products and finishes that are often required for millwork projects are also hard to get.
 - Moisture content varies considerably in softwoods and is too high compared to that found with hardwoods and panels.
 - Green building compliant materials are costly due to fragmentation in the supplier network.
- Millwork projects often use mixed materials. Potential materials that could be used in this industry include lightweight board materials and engineered wood products such as oriented strand lumber (OSL).
- There are numerous challenges associated with the use of these new materials in millworking. OSL, for instance, presents important surface flatness variations when unsanded. New materials can increase tool wear substantially. Thicker elements being specified could benefit from the use of lightweight boards.
- Adhesives used in sandpaper do not work as well as in the past and lead to premature wear of sandpaper. This causes quality control problems as well as additional costs related to claims, increased use, etc.



Environmental, Health, Social and Governance Issues

Partly in reaction to the challenges posed by newly emerging economies, but also from legislative measures put in place in Western countries, the Canadian value-added industry is reconsidering its raw materials, components and practices to ensure that they are less harmful to the environment and that they pose a negligible risk to consumer health. Similarly, consumers are increasingly demanding that products imported from other countries respect human rights (outsourcing) and come from wood that is legally harvested.

According to manufacturers...

- Green building is a key design issue that most companies feel unprepared to deal with. Also, site finishing is becoming difficult due to volatile organic compounds' (VOCs) labour/environmental legislation which prompts the design of fully finished products.
- There is a strong trend towards environmentally friendly products that includes green finishes (pressure treated and oil), but somehow North American manufacturers seem to be missing this opportunity. On this point, Europe is ahead of North America.
- Green building credits are being pursued by architects and designers through material specifications that include low or formaldehyde-free boards, certified lumber and panels, etc. These products are hard to obtain, especially for small orders.
- At this point, the onus for proving that material is green building compliant is on the millwork company. There is also a shared perception that green building is piggybacked on outdated specifications which is leading to many conflicts. Most companies do not feel prepared to interpret green building standards. Suppliers who can keep track of the chain of custody are difficult to find.
- Some companies indicated that government buying specifications are often very outdated and do not reflect current products or practices. For instance, some contracts specify the use of lead paint.

Customer Focus

(consumers, homebuyers, designers, etc.)

Consumers are becoming more and more educated about the products they buy. Widespread access to the Internet makes it easy to obtain third-party information about various products and compare them quickly. Simultaneously, the current North American demographic profile is contributing to the emergence of a market segment that is looking for high-end customized products, and, more importantly, that has the ability to afford them.

According to manufacturers...

- Millwork products' specifications are generally established by designers and architects that have limited knowledge of wood properties, gluing, finishing, etc. This situation is problematic as millwork companies have noticed that designer specs are often of poor quality, outdated, etc.
- Unrealistic specifications force millwork companies to redesign the products ordered and then finish the technical details of designs. This additional work necessarily translates into additional costs.

Manufacturing and Cost Efficiencies

Cost reductions and increased efficiency are permanent drivers of innovation in the Canadian value-added wood products industry. Historically, improvements in this area focused on finding low-cost alternative materials as well as designing technology that could perform manufacturing operations faster, more precisely and at a lower cost than using manual labour. Similarly, improvements were continuously sought with regard to the actual operations performed in factories, i.e., scanning (optimization), sawing, gluing, laminating, sanding, finishing, assembly, etc. However, today's search for efficiency gains encompasses the whole spectrum of operations and material inputs used by a company (i.e., packaging).

According to manufacturers...

- Millwork product manufacturers generally feel that the machining of panel products can be improved. Similarly, there is room for improvement in the machining quality (number of knife cuts/inch) of solid hardwoods.
- Most companies are dealing with finishing quality issues. Finishing is a labour intensive process in which noticeable differences can be seen across operators. Water-based finishes are increasingly called for, but the technology is not yet matured enough to be used on an industrial basis. Fire-rated finishes are often cloudy and crack, especially in natural tones.
- Other manufacturing issues include: gluing veneers with materials that do not contain formaldehyde; glue discoloration when using fire retardant panels; and discoloration of wood beneath UV cured coatings.
- The millwork industry is currently dealing with a shortage of skilled equipment operators which is particularly severe in some regions (e.g., Maritimes). Part of the problem results from the fact that jobs in this sector tend to be low-paying and that workers like to be provided with ongoing training. Apprenticeship programs do exist, but most training is still done in-house. There is also a need for training on project estimation which is a crucial part of the business but sees little official training.



Top Six Innovation Needs and Priorities of the Appearance Product Industry

- Increasing the industry's design and product development capacities
- Developing enhanced finishing products and methods
- Improving the industry's understanding of business models
- Providing the industry with relevant and up-to-date market intelligence
- Developing improved methods for sanding and surface preparation
- Resolving and capitalizing on environmental and social responsibility issues

Innovations for the Millwork and Architectural Woodwork Industry

Incremental innovations are refinements or improvements to existing technologies, products and processes. **Breakthrough innovations** are totally new ways of thinking and doing. They represent significant departures from current processes, technologies, equipment and products used in the industry.

The lists below represent only some of the innovations identified in this project. Please consult the *Roadmap* for a more extensive listing of possible innovations.

Market Access / Intelligence / Competitors

Incremental Innovations

- Develop marketing approaches that are targeted to key demographic segments (e.g., women as decision-makers).
- Improve understanding of consumer buying behaviour (power is in their hands – not suppliers or retailers).
- Identify business models that are sustainable in North America. Focus should be on customer input (customized products and market pull product development), speed of delivery and low production costs.
- Identify distribution channels for different value-added products.
- Determine 2 or 3 niche markets for high value-added secondary wood products and key market access requirements—with information provided for specialty grades.

Breakthrough Innovation

- Assess the market benefits and feasibility of environmental certification in products—products targeted to homebuilders, architects and designers.

Design and Product Development

Incremental Innovations

- Provide millwork companies with periodic publications presenting trends in design and specifications that may eventually impact them.
- Encourage the acceptance of the Architectural Woodwork Manufacturers Association of Canada (AWMAC) standards by architects and designers.

- Develop attractive profiles and designs for fence panels (e.g., microlam curved top rails, ripple profiled decking, high-end garden structures, etc.).

Breakthrough Innovation

- Develop engineered wood products that can be used in value-added applications. Properties that are sought after are surface consistency, fastener holding capacity and green building compliant/environmentally friendly adhesives. Bending strength is not critical.

Material Supply and Properties

Incremental Innovations

- Identify and fill fundamental knowledge gaps in terms of species properties (substitution opportunities).
- Improve colour matching of fibre supply using near infrared spectroscopy and ion mobility spectroscopy.
- Study colour stability of species both in service and in process.
- Develop a grading method that allows for the detection of defects and the assessment of colour.
- Study sorting opportunities prior to sawing.

Breakthrough Innovation

- Evaluate the feasibility and benefits of buying wood bundles in which individual planks are scanned to facilitate optimization in secondary manufacturing. Product would necessarily require shared or compatible optimization software.

Technology and Manufacturing

Incremental Innovations

- Design and develop technologies to support flat panel finishing and assess feasibility of gluing finished surfaces (needed if flat panel and individual product finishing is to be viable).
- Provide unbiased 3rd party information on the performance and properties of cutting tools and other machines used in manufacturing (e.g., machine speeds and materials). Current sources of information come from equipment manufacturers.
- Develop joints for particleboard and MDF drawers in order to avoid using dowels and still meet AWMAC standards.
- Research fire retardant finishes that do not cloud, crack or dull.

Breakthrough Innovations

- Research ways to reduce set-up delays by automating equipment set-ups (e.g., moulder heads).
- Develop knife design equipment that is suited to small businesses.
- Document the influence of wood species and machine parameters on sanding quality and sander belt life.
- Improve non-destructive assessment techniques for quality control purposes targeting integration in manufacturing processes—moisture, density and colour matching are primary concerns.
- Develop kerfless sawing using lasers or other devices.

Environment and Social Responsibility

Incremental Innovations

- Extension activities on green building standard requirements.
- Develop standards to present green building data for individual products.
- Improve knowledge of trends in corporate social responsibility as well as environmental, social and governance issues.
- Perform a comprehensive environmental impact study of processes/products developed in response to environmental pressures (e.g., Are water-based finishes entering the water stream?).
- Develop a guidance document to facilitate the use of green components.

Breakthrough Innovation

- Assist the Canadian forest products industry in the transition towards green building certification and the development of green building compliant materials.



Skills and Training

Incremental Innovations

- Improve the image of the wood products sector presented to potential students to better reflect benefits and advantages.
- Promote wood design in university curriculums.
- Develop case studies of successful companies using skilled labour for high value-added products.
- Develop short-course modules that meet industry needs and constraints.

Reference

Lavoie, P.J.P., D. Fell and F. Laytner. 2006. Roadmap for the Canadian Value-added Industry. Prepared by Forintek Canada Corp. for Natural Resources Canada - Canadian Forest Service. 179 pp.

Value to Wood Research Program Partners



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As part of the *Value to Wood* program, funded by Natural Resources Canada, Forintek's Industry Advisors are providing technical services to value-added wood product manufacturers in all regions of Canada. Find out about upcoming workshops or seminars in your area by visiting us at www.valuetowood.ca or make a request for information on any technical issue related to wood product manufacturing via valuetowood.ca (Help Desk).

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Library
FPInnovations – Forintek Division
Western Region
publications.forintek@fpinnovations.ca
Tel: (604) 224-3221
Fax: (604) 222-5690

Marielle Martel
FPInnovations – Forintek Division
Eastern Region
publications.forintek@fpinnovations.ca
Tel: (418) 659-2647
Fax: (418) 659-2922

www.valuetowood.ca