

What's Inside

- 1 Pallet Market Status
- 2 Pallet Materials
- 3 Pallet Formats
- 4 Pallet Recycling
- 5 Pallet Tools & Rental Systems
- 6 Phytosanitary Measures come to North America in 2011
- 7 Custom Crating
- 8 Current Issues: Recession Demand



This report was produced as part of the Value to Wood Program, funded by Natural Resources Canada – Canadian Forest Service.

Trendspotting is an important tool for enabling manufacturers to be proactive rather than reactive in their business. In this issue we track trends in the pallet industry. Trends revolve around new materials, alternative species, sustainability, the economy and other factors.

Some of the trends in this document are already established while others are in their infancy. As a manufacturer it is up to you to pick and choose the trends and opportunities that best suit your manufacturing, marketing and customer profiles. We hope this document can tip you off to new opportunities, alert you to some pitfalls and inspire your product lines. Good luck!

1

Market Status

90 to 95%
of all
pallets are
made of
wood

Pallets are an ever-present feature of the modern goods' transportation infrastructure. Also known as a "skid", the pallet is a flat structure that supports goods in a stable manner during transportation. Pallets are designed to allow access to forklifts, pallet jacks and other lift-transport devices. While the majority of pallets are made from wood, pallets manufactured from plastic, metal, and paper can also be found. These materials have advantages and disadvantages and are situation specific.

Wood pallets and wood packaging make up nearly 6% of the total packaging consumption in the world. Of this, 90 to 95% of all pallets produced across the globe are made from wood. ^[1]

The global packaging market was valued at \$459 billion dollars in 2004^[12] and the country with the largest packaging consumption per capita was Canada ^[12]. In 2004, North American markets including the US, Canada and Mexico, accounted for the largest share of global packaging at \$135 billion (29%), ahead of Western Europe (27%) and Asia (27%) ^[12]. The US was the single largest packaging market in the world with Japan ranked second, followed by China and Germany.

There has been a significant decrease in the growth of the packaging market in developed countries (Western Europe, Japan, North America) however there has been rapid growth in packaging use in fast growing countries such as China and the Eastern European countries ^[12].

APPROXIMATE MARKET SHARE FOR PALLET MATERIALS *

Wood	95%
Composite Wood	2 to 4%
Paper	1%
Metal	1%
Plastic	1%

*various sources

2

Pallet Materials

Wood

Close to 95% of pallets manufactured are made from wood. Wood pallets have been around for over a century and are still the main type of pallets manufactured and used in the market. Wood pallets can be manufactured using hardwoods and/or softwoods. In the US, approximately 67% of all new and recovered pallets are manufactured from hardwoods, and 33% from softwoods. Wood pallets are strong, stiff, durable, easy to use, and are fairly inexpensive, although they are also susceptible to moisture and insects. Wood pallets are easy to prototype, although fasteners used in the manufacturing of wood pallets can damage products.

Virginia Tech performed a study to test the strength of pallets manufactured from fingerjointed lumber. The study found that fingerjointed green and dry hardwood pallet components could perform at strength and stiffness levels approaching those of non-spliced control pieces ^[18].

Composite Wood

Wood composites (plywood, OSB, particleboard and LVL) represent 2 to 4% of the pallet market. Composite panels have gained some market share in the import and export markets due to their exemption from pest regulations. They have an advantage over plastic and metal pallets due to their lower manufacturing cost and better repair options. Composite pallets have a smooth full coverage deck which allows for smaller objects to be loaded on the pallet. This also allows for better protection of the material on the pallet. Composite pallets cost more than solid wood, are expensive to repair, and are less weather resistant than plastic and metal ^[1].

Paper

Paper pallets, including corrugated, honeycomb, solid fibreboard, and moulded pulp pallets have been around for over a decade and represent less than 1% of the market. Until recently they have not seen a large market share increase due to their limited load bearing and weather resistance properties. Today, corrugated pallets can hold larger loads than before and with the application of moisture-resistant coating are more weather-proof^[1].

There has been an increasing trend towards the use of light corrugated board/pallets for packaging and transportation in the developed countries with Europe having the largest increase in the use of light corrugated board/pallets. This trend has moved more slowly in North America^[12]. The increase in use of light corrugated board/pallets is partially due to the weight-based airfare shipping system and the ease of recycling paper pallets. Other attributes such as a smooth deck surface and lack of pests contribute to this trend. When compared to wood pallets, paper pallets lack stiffness with flexible loads, have lower durability and lower product protection^[1].

Paper pallets made from post-consumer products are a good environmental option for shipping products. There has been a substantial amount of research done to increase the strength of paper pallets and also to increase the use of post-consumer waste in the manufacturing of a paper pallet. In a study conducted by the California Integrated Management System, the energy used to manufacture paper pallets using 40% post-consumer waste was 16% less than that of pallets made from virgin paper^[13].

Metal

Metal pallets claim less than 1% of the market and are generally used for special applications. Materials used to make metal pallets include carbon steel, stainless steel and aluminium with carbon steel having the highest quality at the lowest cost. Metal pallets are superior to wood pallets in attributes such as stiffness, durability and sanitation. However, they are more expensive and usually weigh more than wooden pallets^[1]. Metal pallets are generally used in a closed loop system such as in a plant to transport material from one end to the other. Stainless steel pallets are used in clean room environments and even though stainless steel and aluminium pallets cost two to three times that of wood pallets, when used in a closed system, the long-term costs can be lower than wood pallets.

Plastic Pallets

In 2004 there were 8 million plastic pallets made, with the most common using High-Density Poly-Ethylene (HDPE), Polypropylene (PP) and Polyvinyl chloride (PVC). Costing anywhere between 3 to 6% more than wood pallets, plastic pallets have gained market share in the past decade due to advantages in durability, cleanliness, moisture resistance and being insect free. However, plastic pallets have a small share of the market when compared to traditional wood pallets. This is mostly due to their high price and the lack of repair options. There is also some concern regarding fire and safety ratings of plastic pallets. Plastic pallets are also less resistant to handling wear and tear and tend to get damaged more easily^[1].

Pallet

use

impacts

material

choice

*Choice of
pallet
impacts
recycling
ability*

Wood / Plastic Comparisons

Of the non-fibre based pallets, plastic is the most likely medium- to long-term competitor for wood. One of the major issues involved in comparing wood to plastic pallets is the lack of unbiased information known about the long-term environmental impact of plastic pallets. Another issue is the large variety of wood and plastic pallets available in the market.

Regardless of material, it is proven that one of the ways to be more environmentally friendly is to reuse the same pallet a number of times. Wood pallets are recycled many times and when they are no longer fit for use, the parts are used to repair other pallets or they are turned into other by-products. It is true that there have been many advances in recycling plastic to eliminate the use of virgin material, but in most cases a certain percentage of virgin resin is still required ^[8].

Environmental sustainability is a concern for most organizations, therefore it is important to ensure that practices and products are truly sustainable. In order to have a full understanding of the impact a product has on the environment, it is important to consider the environmental impact of manufacturing, use and disposal of that product. This can be done using a method called Life Cycle Analysis (LCA).

Virginia Tech recently conducted a study to analyse the impact from manufacturing, use and disposal of wood vs. plastic pallets. The study used a 1000 x 1200mm multiple use wood pallet and a similar synthetic plastic pallet (50% recycled plastic and 50% new HDPE). The results of the study demonstrated that wood pallets are considerably more environmentally friendly and that the energy used for manufacturing the plastic pallet was five times higher than that of the multiple-use wood pallet. Moreover, the wood pallet used considerably less material and contributed less to air and water emissions than did the plastic one ^[7].

100% Recycled Waste Plastic Pallet

Used packaging materials are no longer considered garbage, and every day less of these materials are put into landfills. Many companies are trying to create different ways to reuse these materials. NextLife, a green product development organization, has developed a plastic pallet that uses 100% recycled waste materials. The pallet is a 48"x40" one-piece injected block style pallet made from recycled resin that costs nearly 50% less than that of new resin. This pallet cannot be used for perishables as it does not meet the food-grade requirements ^[6].

Pallet Formats

There are two main structural designs used for manufacturing pallets: block and stringer. Block pallets are traditionally made of softwood and are the primary type used in Europe. Stringer pallets are traditionally made using hardwood and are the main type of pallets used in North America.

Most block pallets require more construction material than stringer pallets, a block pallets' main advantage comes from its design aspect which allows for full four-sided access when using a forklift. Stringer pallets can only be fully accessed from two sides. Some stringer pallets do have small notches on their non-accessible side which could be used for partial access using a forklift ^[1]. It seems when it comes to pallet design, the block pallet is becoming more favored over the stringer pallet.

Figure 1: Block Pallet

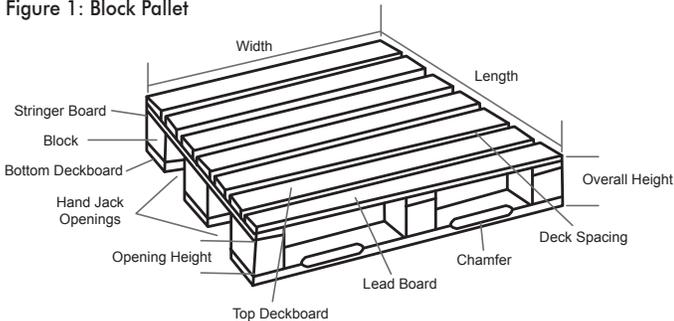
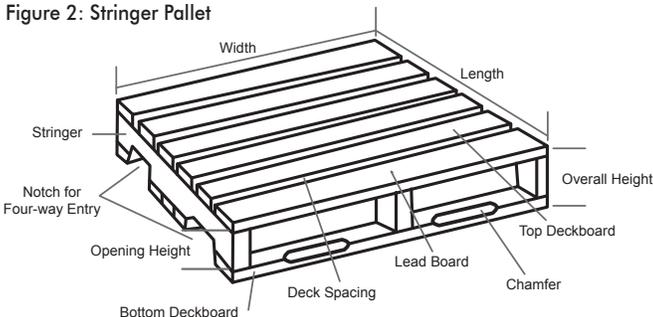


Figure 2: Stringer Pallet



Retail giants Costco and Wal-Mart in the United States have demonstrated that they prefer block pallets over stringer, and that they will be encouraging their suppliers to ship products on block style pallets. This is mainly due to the advantages gained by the block pallets' four-way accessibility. Block pallets are becoming more popular not only in North America but also in other typically stringer pallet markets such as Central and South America.

The growth in international trade has pushed various industries to standardize the type of pallet they use for shipment ^[2]. This trend is being set by a variety of industries and organizations dealing with the manufacturing and distribution of pallets around the globe. CHEP's (Commonwealth Handling Equipment Pool) pallet rental system has had a large influence in the trend towards block pallets. In the 1990's CHEP's US rental pool started with a 48"x40" stringer pallet, however in recent years CHEP has decided to use a 48"x40" block pallet. This comes as no surprise since CHEP has long been using block pallets on other continents. The National Wooden Pallet and Container Association (NWPCA) is working with various trade associations to develop a Pallet Management System using 48"x40" block pallets ^[2].

It is important to remember that block pallets are generally made using softwood as opposed to hardwood which is most often used for manufacturing stringer pallets. This is a cause of concern for many stringer pallet manufacturers wishing to switch to manufacturing block pallets, as they have to source new supplies for softwood. ^[2]

*Block
pallets
offer
greater
flexibility*

Pallet Sizes

More than ever, the economy is forcing North American manufacturers to look for customers and raw materials outside of North America. It is important to be aware of laws and regulations involving shipping and receiving of goods overseas. For example, a European customer might ask to have products shipped using a EuroPallet. A EuroPallet is an 800 x 1200mm (31¹/₂" x 41¹/₄") block style softwood pallet marked by the letters "EUR" indicating that it is a certified EuroPallet. All pallet manufacturers have to be certified by the European

Pallet Association (EPAL) or USEPAL in the United States. Some European countries charge disposal fees on pallets that are not standardized. In Germany, a two Euro disposal fee is charged for nonstandard pallets. A EuroPallet has positive value as it can be sold anywhere from 5 Euros to 13 Euros depending on the pallets' condition. A EuroPallet of higher quality is stronger, stiffer and more durable than most stringer pallets.

A new EuroPallet costs approximately \$12 to \$20 in North America, which is around 45% more costly than a stringer pallet in a similar class. A EuroPallet is on average 50% heavier than the equivalent sized US stringer pallet and is ⁵/₈" to ¹/₈" taller than a North American stringer pallet ^[4].

The International Standard Organisation (ISO) has recognised six pallet footprints for intercontinental transportation (Table 2). The details can be retrieved from ISO Standard 6780 ^[3].

TOP 5 PALLET SIZES IN NORTH AMERICA (2000).		
Pallet Size (inches)	Product Rank	Typical Industry
48 x 40	1	Grocery, common pallet
42 x 42	2	Telecommunications, paint
48 x 48	3	Drums
40 x 48	4	Chemical, beverage
40 x 40	5	Dairy

Pallet 1047, John Clarke ^[1]

PALLET FOOTPRINTS RECOGNIZED BY ISO ^[3]			
Dimensions (millimetres)	Dimensions (inches)	Wasted floor, ISO Container	Region
1219 x 1016	48.00 x 40.00	3.7%	North America
1200 x 1000	47.24 x 39.37	6.7%	Europe, Asia; similar to 48x40"
1140 x 1140	44.88 x 44.88	8.1%	Australia
1067 x 1067	42.00 x 42.00	11.5%	North America, Europe, Asia
1100 x 1100	43.30 x 43.30	14%	Asia
1200 x 800	47.24 x 31.50	15.2%	Europe; fits many doorways

Pallet Recycling

European Union

Recyclability of fibre and packaging products has become an important issue around the globe. Most countries have set various programs in place to prevent packaging material from ending up in landfills. The EU has set recycling targets for industrial packaging waste which includes materials such as single-use pallets, mountings, wood boxes, packaging framework and other material used to protect goods during transportation. The EU requires at least 60% of the fibre-based packaging waste to be recycled, although some European countries have already surpassed this requirement. Finland for example recycles over 70% of its fibre-based packaging waste ^[5].

United States

The US packaging industry is an important player in the low-grade wood material market. One-third of the volume of US low-grade hardwood is used in the manufacturing of pallets and containers. There are no government regulations for recycling of pallets and other fibre-based packaging material, although the packaging industry has worked hard to conserve natural resources and reduce wood material in the waste stream and these efforts have resulted in a significant reduction of wood-based packaging waste.

*Wood pallets
are most
often
repaired
and reused*

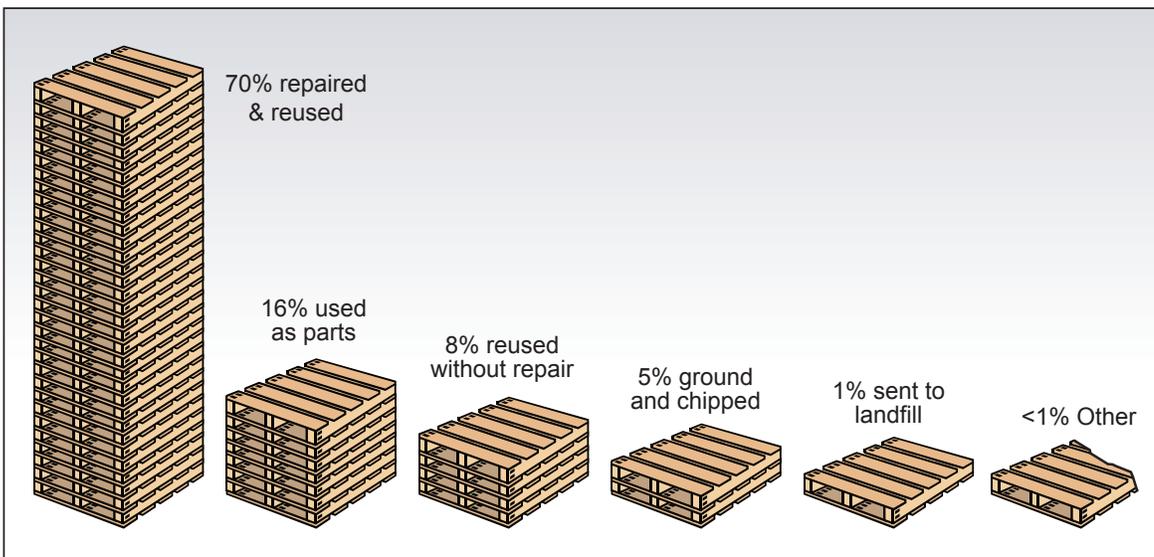


Figure 3: Recovery and reuse of pallets in United States ^[14].

Pallet Pools & Rental Systems

*Multiple-use
pallets
are
more
eco-friendly*

In a recent Life Cycle Analysis (LCA) study, the Netherlands Packaging and Pallet Industry Association compared the environmental aspects of 800x1200mm block style single-use wood pallets vs. similar multi-use wood pallets. Even though the multiple-use wood pallet was manufactured using approximately two times as much wood as that of the single-use pallet, the multiple-use pallet was deemed to be more environmentally friendly. The result of the study indicated that the energy consumption, solid waste generation, and emissions from manufacturing and use of the multiple-use wood pallet were approximately 50% less than that of the single-use wood pallet ^[7].

One of the main issues with shipping products on a pallet is recovering the pallet after delivery. It is very costly, and when shipping across continents, the cost of recovery is more than that of the pallet. This results in the abandonment of pallets, or in the case of single-use pallets, the disposal of the pallet. Most developed countries have created various types of pallet rental

and management systems to prevent such outcomes. The Commonwealth Handling Equipment Pool (CHEP) is one of the largest companies utilizing these types of pallet management systems, and does so in 44 countries around the globe ^[10].

Pallet pooling is very popular in Europe as almost all of the central European countries are involved in some type of pallet pooling system.

In the past, pallet pooling has not been as popular in the US as it is in Europe. However, due to increases in material cost, environmental concerns and the cost savings that can be achieved, American manufacturers have become interested in using pallet pooling systems. The most popular pooling system in the United States is the CHEP pooling system. The Canadian Pallet Council (CPC) is highly used in Canada, with over 1,400 members across Canada. The table below demonstrates some of the popular pallet pooling systems used in different countries.

COMMON PALLET POOLING SYSTEMS				
	Identification Colour Code	Service Span	Operation System	Description
Canadian Pallet Council (CPC)	Orange	Canada	Exchange	Non-profit pallet exchange 1400 members and over 7 million pallets
European Pallet Association (EPAL)	No Colour/EUR/EPAL stamp	Europe/North America/Asia/Australia	Rental/Exchange	Global pallet pooling association
EuroPallet	No Colour/EUR stamp	Mostly Europe Small operation in North America/China	Exchange	Oldest exchange system Based in Europe
Commonwealth Handling Equipment Pool (CHEP)	Blue	Europe/ North America/Parts of Asia	Rental	Largest rental pool across the globe
Logistic Packaging Return (LPR)	Red	Europe	Rental	One of the largest rental pools in Europe
IPP Logipal	Brown	Europe	Rental	One of the largest pallet producers and pallet pooling companies in Europe Part of the Faber Halbertsma Group
Pallet Return System (PRS)	Green	Europe/Turkey	Rental	Similar to IPP Logipal Part of the Faber Halbertsma Group

In the past decade, due to environmental concerns and the globalization of markets, the use of pallet pooling and rental systems has increased. Pallet management systems can become complex at times, especially when the chain of custody increases beyond three or four companies located in various parts of world. Due to this situation, some companies manage to simplify their system by opting for either a one-way rental or a pallet exchange/pooling program. However in order to be more efficient, companies should consider optimizing their pallet management system depending on the final destination of the product. For example, use a one-way rental system for long-haul shipping and a pallet exchange system for local shipping ^[9].

One system proven effective in local programs is the exchange-in-time. It works in central areas where most network nodes (stores and warehouses) are in fairly close proximity to one another. When full pallets are delivered to the destination, the empty

pallets from the previous deliveries are loaded and taken away to other network nodes. Note that the empty pallets are of the same quality and specification as the full pallets arriving. This process is carried through various network points within a pooling system ^[10].

The National Wooden Pallet and Container Association (NWPCA) has put forward a non-profit industry-wide pallet supplier management system, governed by a board of directors, pallet manufacturers and distributors, with members owning a fraction of the system. A third party inspection agency will ensure the quality of the pallets in circulation, while the NWPCA will manage and control the pallets in conjunction with the pallet suppliers and owners. A bar code and a Radio Frequency Identification tag will be attached to the block pallet, and the NWPCA will be in charge of repairing the pallets that belong to the system. This program is being modeled on Europe's EPAL and the Canadian Pallet Pool (overseen by



*ISPM No. 15
will guide
movement
of pallets
in North
America*

Canadian Pallet Council CPC) ^[19].

Currently, wood packaging products moving between the United States and Canada are exempt from the ISPM 15 regulation. Phytosanitary Measures (ISPM) No.15 is an international standard set to prevent invasive fungus and insect species from spreading country to country. The standard requires all wood packaging products to be heat-treated or fumigated and stamped with the correct information. With the large increase in the number of invasive species being introduced in both Canada and the United States, CFIA and APHIS have agreed to terminate the exemption and enforce the ISPM No.15 for wood packaging products crossing the border. This will further aid the effort to prevent the spread of invasive fungus and insect species between the two countries. To ensure that the industries on both sides of the border are prepared for this change, CFIA and APHIS are developing a multi-year phase-in strategy. Complete implementation of ISPM No.15 is expected by 2011 ^[11].



Almost anytime a product needs to be transported from one location to another, the packaging needs to meet certain dimension requirements depending on the mode of transportation. It is important to consider the overall size of the crate the product is transported in. Depending on the fragility of a product, some crates need to be one-third to two-thirds larger than the product to ensure proper protection during transportation.

There are also various height restrictions depending on the means of transportation. These restrictions are generally based on the door opening or the ceiling height. When it comes to air-bound shipments, 64" or less is generally accepted (shown in Table). In most cases, it is important to include the pallet height in the total height. When shipping a pallet via air, it is recommended to restrict the length to 120". There is a possibility that the airline would charge for space designed for two pallets, even if the crate is oversized by just a few inches.

There are also some restrictions when it comes to shipping via ocean. Most standard containers have a height and width of 90" and 94" respectively. The length could vary, although the most common lengths are 20' and 40'. Crate height should be kept at least one inch lower than the height of the container to allow for ease of loading and unloading. Consulting the freight company for the best option is quite important when the dimensions of a crate are close to the maximum standard dimensions ^[15].

STANDARD DIMENSION RESTRICTION FOR VARIOUS MEANS OF SHIPPING

	Length	Width	Height
Standard Air Pallet	10'	82"	64"
Standard Sea Container	20'/40'	93"	89"
Truck With Standard Swing Doors	20'	99"	110"

Recession Demand

The current state of the housing and auto industries have had a large, negative impact on the pallet industry due to the drop in demand for products that would generally be shipped on pallets. However, the pallet industry has been only slightly impacted because pallets are used in the shipment of non-discretionary items. In fact, the number of pallets used in the grocery and clothing sectors have increased rather than decreased.

Late in 2007, the main concern for pallet manufacturers in the US was the shortage of material and not the slump in the economy ^[16]. The shortage for raw material reached eastern Canada in the early 2008. Downtime taken by many hardwood mills in Canada due to the recession created limited supplies for pallet manufacturers forcing them to look for new sources of raw material. Some smaller mills increased production to meet the demand, however the quality of the products were often lower than typical.

*Pallets
continue to be
in demand
during
recession*

1. John Clarke. 2003. Pallet 101: Industry Overview and Wood, Paper and Metal Options.
2. Ed Brindley. 2008. Block Pallets in Our Future? Block Pallet Manufacturing Methods.
3. ISO 6780.2003. Flat Pallets for Intercontinental Materials Handling - Principal Dimensions and Tolerances.
4. Pallet Enterprise. 2002. EuroPallet: Good or Bad for Business.
5. Finnish Forest Industry. 2008. Fibre and Wood Packaging and Excellent Solutions for the Environment.
6. Chaille Brindley. 2008. Green Biz2.0: NextLife Develops 100% Recycled Pallet for Major Retailer.
7. Peter Hamner, Marshall White. Virginia Tech: Convergence of Two Shades of Green - Environmental Impacts from the Manufacture, Use, and Disposal of Pallets.
8. Ed Brindley. 2008. Wood or Plastic Pallets: Which Options Are More Eco Friendly?
9. Rick LeBlanc. 2008. Market in Transition: Designing Pallet System for a Sustainable Future.
10. Shousong Jin. 2008. A Discussion about Chinese Pallet Pool Co. Ltd. Zhejiang University of Technology.
11. Tina Stafford. 2008. Proposed Removal of the Exemption of ISPM 15 for Wood Packaging between Canada and the United States.
12. World Packaging Organisation. 2008. Market Statistics and Future Trend in Global Packaging.
13. US Department of Energy. 2001. Pallet Production Using Post Consumer Waste Paper.
14. Robert Bush. 2007. Recovery, Reuse, Recycling, by the United States Wood Packaging Industry. 1993 to 2006.
15. Dan Schultze. 2007. Custom Crating Considerations
16. Jeff McBee. 2008. Room for Optimism in 2008.
17. Jeff McBee. 2008. Market update: Canada's Hardwood Market Facing Familiar Challenges.
18. Peter Hammer, Marshall White. 2006. Virginia Tech Study Shows Potential for Finger-Jointed Pallet Parts.
19. Tom Andel. 2008. Modern Materials Handling Magazine. Not-for-Profit Pallet Pool Comes Ashore.

"Market and Attribute Trends" is a series of fact sheets aimed at improving awareness and information on market trends that shape the demand for wood products. Markets and Attribute Trends is complemented by a "Facts on Wood" series that provides technical information on the various commercial wood species in Canada.

Through the Value to Wood program, Canadian wood product manufacturers have access to the expertise and information they need to extract greater value from wood resources. To download the Market and Attribute Trends, visit www.valuetowood.ca

FPIInnovations™ works towards optimizing the forest sector value chain. It capitalizes on Canada's fibre attributes and it develops new products and market opportunities within a framework of environmental sustainability. As a world-leading provider of technology development, application and knowledge transfer, the not-for-profit forest research institute helps implement innovative manufacturing solutions that provide the industry with long-term competitive advantage.

How to contact us:

Roland Baumeister
 2665 East Mall, Vancouver, BC
 V6T 1W5
 Tel: 604 224-3221
 Fax: 604 222-2922

Gérald Beaulieu
 319, rue Franquet, Québec, QC
 G1P 4R4
 Tel: 418 659-2647
 Fax: 418 659-2922

www.valuetowood.ca
www.solutionsforwood.ca
www.fpinnovations.ca



™ FPIInnovations, its logo, and Forintek are trademarks of FPIInnovations.