GROWTH AND REINVENTION 2017

A North American Perspective on the Global Wood-Based Panel Industry

Authors

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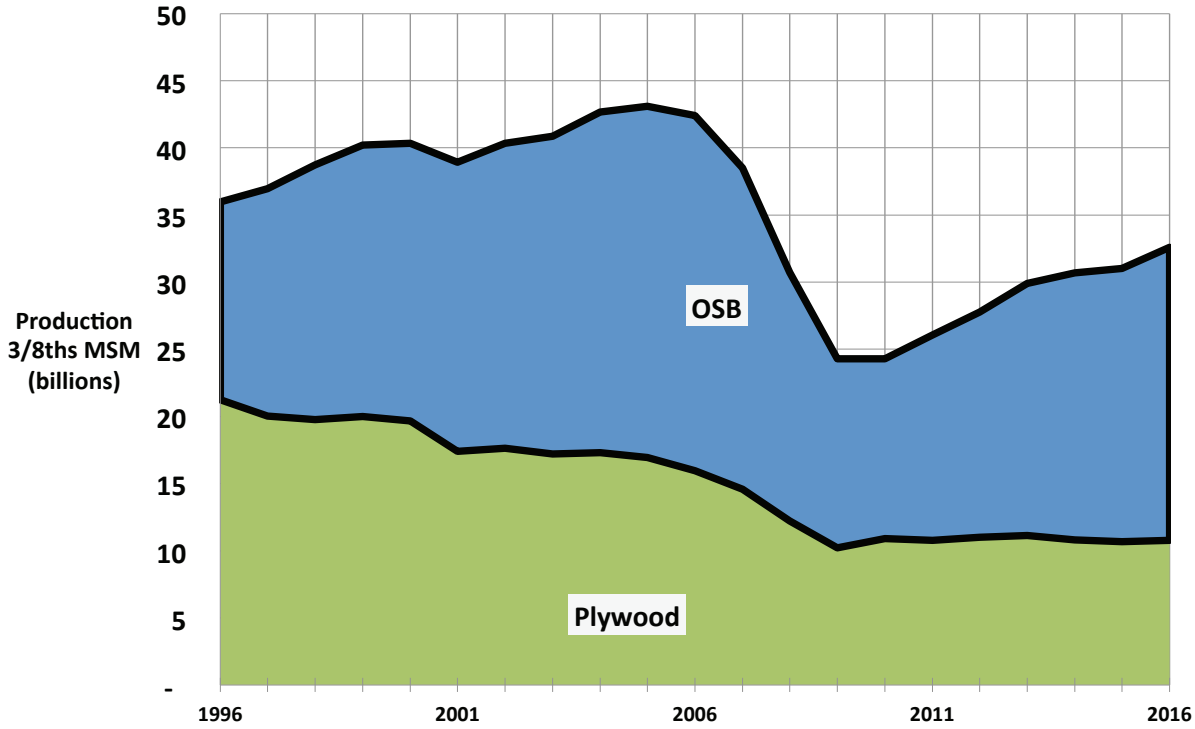
(Author's note, much of the editorial material is taken from Presentations of Fred Kurpiel and Dick Baldwin at the 10th European Wood-based Panel Symposium, 6 October 2016 in Hamburg, Germany, with some data updates)

Worldwide usage of plywood, the original engineered wood panel, has continued to grow, However, North American plywood production and consumption has finally stabilized (2012-2016) after steadily declining since the 1987 peak. The decline was particularly sharp from 2007 to 2009 during the years of the Great Recession.



Fugure 1: Exhibit 1: N.A. Structural Panel Production (1996 thru 2016)

source: APA

Oriented Strand Board (OSB), plywood's lower cost structural panel competitor, has flourished in North America over the past forty years, and is now becoming widely known worldwide. North American annual production volume of 16.8 billion feet (3/8" basis) in 2012 grew to nearly 22.0 billion feet by 2016 as the North American economy rebounded and manufacturers increased their focus on value-added products such as furniture frames, longer-length panels, fire-rated sheathing, and radiant barrier sheathing.

Since the 2008 Great Recession, the number of panel production facilities in North America (including Laminated Veneer Lumber (LVL), Medium Density Fiberboard (MDF), and particleboard, in addition to OSB and plywood) has declined about 25% in aggregate (Table 2).

But now producers have announced or already opened several greenfield facilities and previously shuttered mills.

What are the current drivers in North America and worldwide? What are the trends that influence survival and growth? These questions and others are being answered as the North American and global economies struggle through what the Wall Street Journal and others have described as the slowest post-recession recovery since World War II.

N.A. OPERATING MILL COUNT	2006	2015
LVL	23	17
MDF	24	20
OSB	64	48
Particleboard	36	26
Plywood	86	60

Table 2: Panel Industry has shrunk by about 25% since the Great Recession

Plywood and Veneer Based Products, a Global Overview

Plywood is considered the pioneering engineered wood panel. Typically assembled with alternate grain direction between layers, plywood's unique attributes of stability, strength, durability, and beauty offer versatility to develop new uses

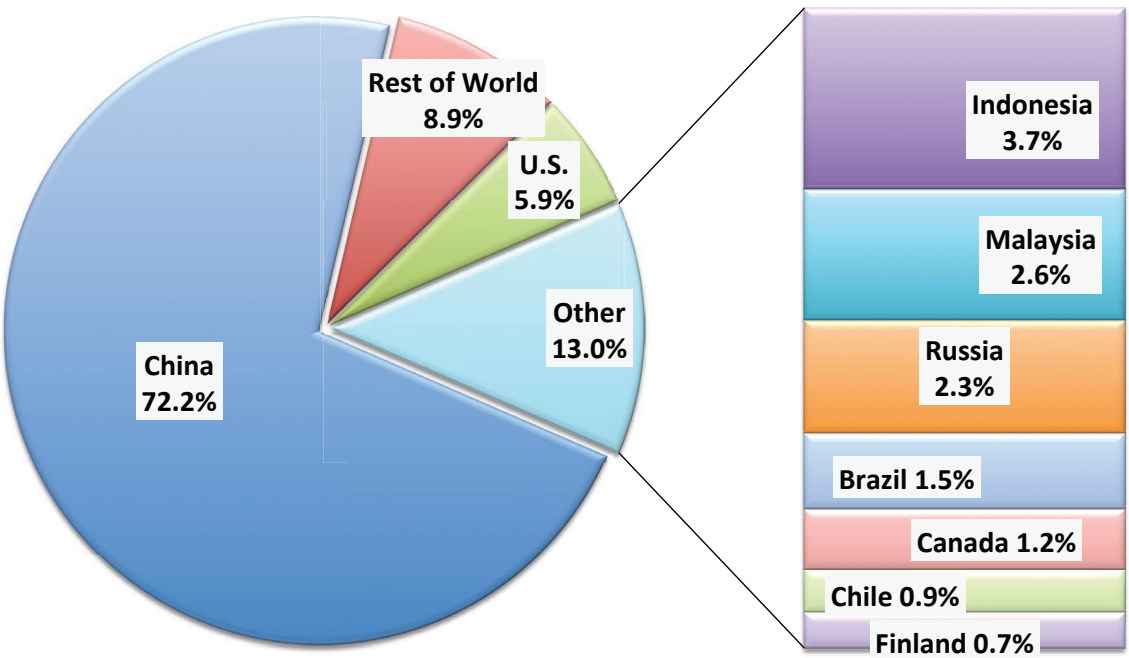
in addition to retaining many of its traditional applications. Understanding plywood's competitive operating environment, and determining how to best meet customer needs, is key to future growth.

Three trends are changing the dynamics for the plywood and veneer-based producer.

- Raw material is available in an increasing array of suitable species and types. Small log diameters and non-traditional species are becoming less of a barrier to efficient operation.
- Wood's high strength-to-weight ratio make veneer a versatile raw material that can be assembled into plywood and other veneer-based products that outperform competing construction materials such as lumber, steel, and concrete.
- Plywood can be successfully manufactured from a wide variety of technologies ranging from crude to sophisticated. Plywood manufacturers use simple technology in some regions, but in other regions automation, robotics, and other technologies increasingly play a key role.

Plywood has many uses. New veneer-based applications are evolving from the traditional flat panel. Laminated veneer lumber (LVL), now a mature product, is something more than a parallel laminated plywood assembly; and even now one West Coast manufacturer is gearing up to produce a Mass Plywood Panel (MPP) that could challenge layered solid lumber systems in constructing high rise wood-based structures. The common thread for the successful producer is creativity in manufacturing a lower-cost product from the available labor, raw material, and capital.

Asia is driving most of the increase in global production. Over the past three decades, China has become the world's largest producer with thousands of generally small mills (Figure 3). According to the Chinese Forestry Association, only about 10% of plywood made in China is exported. In the author's opinion, China has increased production at a non-sustainable rate of growth given that forests in China are already fully utilized.



Fugure 3: Production Share (2015) Global Production = 156.9 million m^3 Countries w/ production > 1.0 million m^3 are Listed

source: FAO of UN

North American Plywood's Competition

Plywood is a globally traded product. International plywood trade more than doubled to $14.4 billion in 2015 from $6.6 billion in 2000. According to a source quoted by Woodworking Network, "The global market for plywood is projected to reach 223.4 billion cubic meters by 2022, driven by recovering construction activity in most countries worldwide; rise in high value, high rise construction, a growing preference for plywood in interior design especially for floors, ceilings, and walls, and a healthy furniture industry." (Woodworkingnetwork.com, "Construction, China demand to drive global plywood growth to 2022", Oct. 24, 2016).

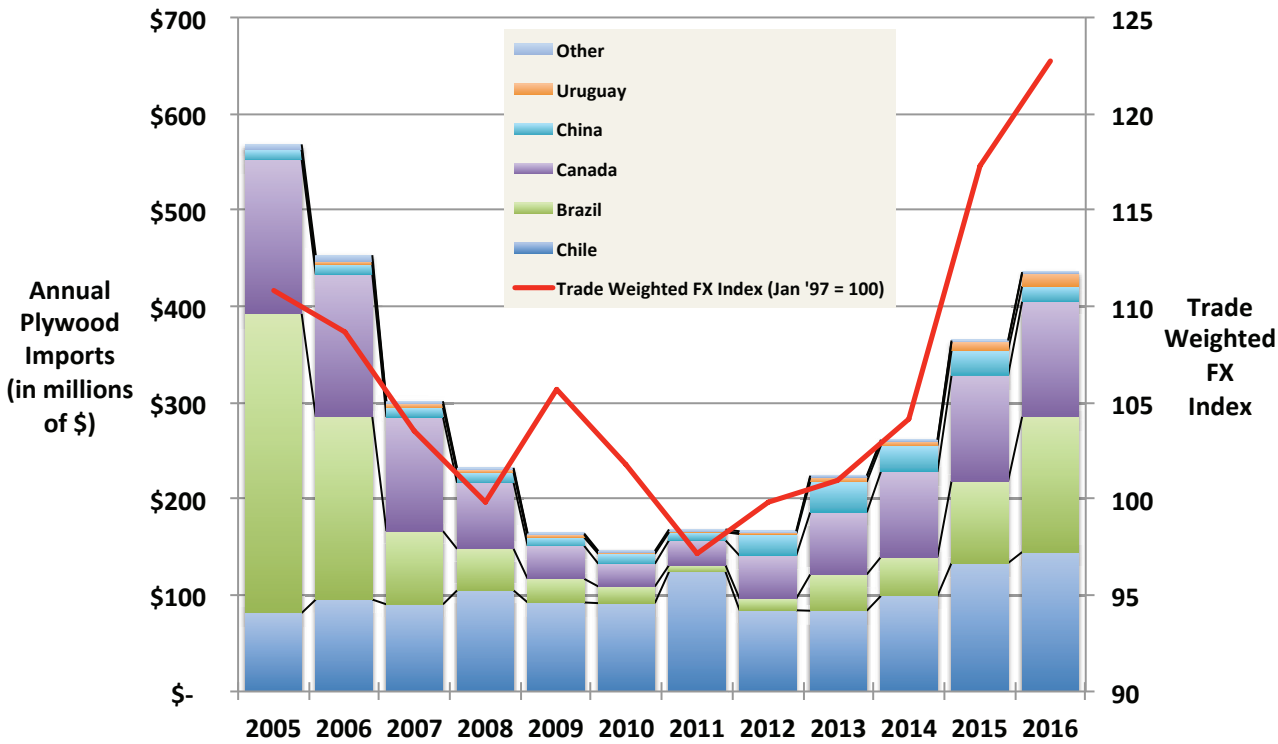
According to USDA Foreign Agricultural Service trade data for 2016, softwood plywood imports into the United States increased 49% percent to a total of 1.4 billion feet (3/8" basis), or roughly 15% of United States production. Import volume from Brazil doubled in 2016 and imports from Canada and Chile also grew. Currently about 90% of Chinese-made plywood is consumed internally, but in time China could join Brazil and Chile as a significant exporter of softwood plywood to North America. As shown in Figure 4 , imports roughly equaled production of four larger-capacity North American mills (large capacity defined by the author as mills with rated capacities greater than 300 million feet (3/8" basis).

While stable for the last few years, the secular decline of the North American plywood industry is provoking considerable soul-searching. Thoughtful questions include what changes have occurred in the market? What are the implications for now and over the longer term? How can this analysis provide a basis for decision-making in 2017 and later? What can the North American producer do to prosper within a global market?

Four steps, as customized for individual mills, can make the difference.

1. **Green End: Key to Volume and Yield.**

   Steps often will include the introduction of advanced electronic innovations in conjunction with redesigning equipment and



Fugure 4: Softwood Plywood Imports vs. USD Exchange Rate 2005 to 2016

source: Foreign Agricultural Service, St. Louis Fed

processes, while reshaping human processes to emphasize involvement and engagement.

2. **Dry End: Multiplying Efficiency.**

   Where feasible introduce the 'latest generation' veneer dryers. State-of-the-art high-speed dryers (that also are much more energy efficient) double production in half the floor space compared to many older systems.

3. **Marketing: Overcoming Incorrect Perceptions.**

   Overcoming perceptions that define plywood, such as wood products harm the environment or OSB is always equivalent to plywood, for many potential users and educating the market on innovative new uses.

4. **Leadership: Changing the Workplace.**

   Adoption of best management practices and a new collaborative leadership style are required to effectively integrate a renewable resource, an advancing manufacturing process , and continually evolving customer needs.

The operating environment will continue to evolve in unpredictable ways. The best answers will come from innovative "thinking and doing" appropriate for each mill's unique circumstances. The "survivors of the survivors" will be those that nimbly adapt to the changes.

What ahead for OSB, MDF and other wood based Panels

Oriented Strand Board (OSB) is a phenomenal example of product acceptance and growth since its rollout as the 'poor man's plywood' during the early 80's. This reconstituted product has steadily won market share from plywood. OSB mill locations now span the globe as OSB becomes globally accepted, with mills in at least fourteen countries. Currently it is making inroads into underlayment and furniture frame markets that have long been dominated by plywood. What is the future of OSB?

Some believe that offshore producers will not become substantial exporters for many years because of growing local demand. Others believe that the shipping costs associated with heavy OSB panels confine it to local markets. In our opinion OSB will cross national boundaries, with the main determinate being manufacturing cost, transportation cost, and the currency relationships and trade policies that govern global trade.

North American Wood is an Environmentally Friendly Building Material

Preservation of the natural environment has become increasingly important to society. Wood is more environmentally friendly than competing construction materials (Table 5), according to research conducted by the Consortium for Research On Renewable Industrial Materials (CORRIM). Plywood and other panel products made in North America now come from a renewable resource, with a wide variety of species from diverse growing sites. Virtually the entire delivered timber stem is transformed into veneer or a usable byproduct. Depending on the region within North America, the replanted tree will again be ready for processing by lumber and veneer producers in 25 to 100 years.

COMPARATIVE ENVIRONMENTAL PERFORMANCE INDICES

	WOOD (scaled at 100)	STEEL	CONCRETE
Embodied Energy	100	117	116
Global Warming Potential	100	126	131
Air Emission Index	100	114	123
Water Emission Index	100	412	100
Solid Waste (total kg)	100	99	151

Embodied energy is the energy consumed by all of the processes associated with the production of a building, from the mining and processing of natural resources to manufacturing, transport and product delivery.

Table 5: Wood vs. Steel vs. Concrete Construction

source: Consortium for Research on Renewable Industrial Materials

Building Greenfield Panel Manufacturing Plants in North America…Again!

The world is rapidly becoming a single market in which products compete primarily on delivered selling price. The unresolved question is how the North America panel producer will stay competitive.

The textbook answer is to control major costs such as wood, labor, energy, glue and other chemicals, and the costs of selling and market logistics. The ongoing goal is to provide the highest quality product at the lowest price, while creating a profit for the shareholders. That is a tall order, and the stakes are high.

According to the American Forest and Paper Association (AF&PA), the U.S forest products industry employs approximately 937,000 workers and accounts for approximately 5% of total U. S. manufacturing GDP, which places the industry roughly on par with the automotive and plastics industries. The forest products industry is among the top ten manufacturing sector employers in 45 states and generated over $282 billion in shipments and about $54 billion in annual payroll during 2015.

Industry turbulence is expected to continue as the wood-based panel industry continues to reshape its manufacturing base in North America and globally.

Profitability over short-term economic cycles and long-term secular trends depends on positioning the company and its mills within the market.

A number of ownership changes have occurred as investors become more bullish on the panel industry. Capacity expansion and modernization is also underway and, after almost no new construction for a decade, there are several greenfield projects such as the following:

Medium Density Fiberboard. Three new MDF plants were completed in Mexico in 2016. Several more have been announced or are in the planning stage for other sites in North America.

OSB. A modern, high capacity OSB mill is nearing completion in East Texas and will become operational during third quarter 2017.

Particleboard. Construction is underway in Michigan for the world's largest particleboard plant, with a 2018 completion date.

Plywood. Two new state of the art softwood plywood facilities were completed in 2016 (one in Oregon, the other in Mississippi). These are the first greenfield plywood mills built in North America in more than twenty years.

In addition, we understand that other new production facilities are in various stages of planning. While industry segments may continue to right-size to better match demand with excess supply, some of the capacity from closing inefficient mills is being replaced with efficient new factories. There is a renewed confidence that each segment of the wood-based industry can be profitable with the efficient use of fiber and other resources at a scale that optimizes manufacturing costs.

There is a purportedly ancient Chinese expression that states, "May you live in interesting times." The current era features wood-based panels with differing applications and technologies, rapidly expanding global demand, and the complexity of trading between nations. The interesting times are now.

ABOUT THE AUTHORS

Dr. Dick Baldwin, Dr. Fred Kurpiel, and **Mr. Rich Baldwin** are recognized industry specialists for structural panels, composite panels, and engineered lumber products. They bring extensive hands-on knowledge of plywood, veneer, and engineered lumber products manufacturing and marketing to their analysis of the wood panel industry.

Dr. Richard ("Dick") F. Baldwin, Managing Partner, Oak Creek Investments LLC recently served as President and General Manager of Winston Plywood & Veneer (Louisville MS) from April 2014 to September 2016, Omak Wood Products (Omak WA) from September 2014 to September 2015,

and Chester Wood Products (Chester SC) and Moncure Plywood (Moncure NC) from April 2008 to September 2013. Notable highlights include leading the planning, financing, construction, and start-up planning for the $110 million Winston Plywood & Veneer project (one of two greenfield softwood plywood and veneer mills built in North America over the past twenty years) and preparing the Chester and Moncure businesses for their September 2013 sale to Boise Cascade for $102 million. Dr. Baldwin has authored dozens of books and publications on forest products industry management, operations, maintenance, and marketing, including Plywood and Veneer-Based Products (published in 2016).

Dr. Frederick T. Kurpiel has considerable hands-on experience in sales and marketing of wood panels (MDF, OSB, Particleboard, Plywood), upgraded products (such as Cabinetry, Doorskins, Flooring, Furniture components), and engineered wood products for North American wood-products manufacturers, as well as wood production machinery for several European suppliers of wood manufacturing equipment. While manager at the APA office in London, Fred was the lead researcher and author on several studies that analyzed the potential sale of U.S. wood panels in foreign markets; the initial efforts concentrated on plywood and later included OSB. In recent years, Dr. Kurpiel has devoted considerable effort to understanding the strategies of East Asian (China, Indonesia, Malaysia, Thailand, Vietnam) wood panel producers.

Mr. Richard ("Rich") W. Baldwin put together the original business plan for the Winston Plywood & Veneer facility in Louisville MS as consulting Vice President of Strategic Planning for Winston Plywood & Veneer and Omak Wood Products, periodically updated the business plan as the project started up, and participated in debt and equity capital raising efforts. Over the course of his career, Rich has put together dozens, if not hundreds, of financial models and business plans for forest products manufacturers. At various times in his career, Baldwin has served in Controller, Treasury, and Analyst positions at forest products companies in the Southeastern U.S., Northwestern U.S., Latin America, and Southeast Asia. Previously, Rich worked for well-known Wall Street firms as investment analyst for the life insurance and annuity industry and the retail and consumer products industry.