KEYNOTE ADDRESS

ADDING VALUE TO LUMBER

by

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SUMMARY

"Adding value results from a set of actions or processes taken on lumber which raises its net value in the market place". This paper explores the current lumber resource in Canada, where in B.C. and Quebec the demand for softwood lumber has already outstripped the annual allowable cut. The threat of product substitution is shown to be real and serious, with examples from the wood window and door, railroad tie, and timber frame housing sectors. Examples of adding value to lumber are described from wood preservation, wood windows and doors, species separation, incising, kiln drying and finger jointing. It is clear that opportunities are available for adding value to lumber in the coming decade where we face a declining demand for commodity products. The importance of value over volume is stressed.

INTRODUCTION

As attendees at this 10th Annual Meeting of CWPA I would suggest that all of you in one way or another are involved in adding value to wood. Wood is the basic building block from which, by your collective endeavors, you create products of higher net value. This observation provides the foundation for my key-note address today. I do not intend to provide a total overview of this subject, which has already been done by others more qualified than myself. But rather to consider some of the more basic reasons for adding value as they apply in Canada today, what we are already doing about it and where we may go in the future.

Within the field of wood products I have decided to concentrate on adding value to softwood lumber and I have selected some examples to illustrate the opportunities that currently exist for expanded growth and profits. But firstly, we must consider what is meant by added value.

Added value results from a set of actions or processes taken on lumber which raises its net value in the market place. Improvements in the initial yield of lumber from the log may be considered added value, but for the sake of this presentation I consider this to be captured value and outside of the present considerations.

THE LUMBER RESOURCE

Canada for over the last 50 years has been a mass producer of lumber from our vast coniferous forests. In 1986, Canada supplied 51% of the exported softwood in the world and B.C. alone accounted for 40% or over 9 billion board feet (Figure 1)(1). Our reserves of softwood were thought to be unlimited, yet recent studies have shown this to be incorrect.
Between 1975 and 1985 total roundwood harvest in Canada increased by 53 million m^3 and 93% of this was softwood. Based on 1988 provincial annual allowable cut (AAC) estimates, an apparent surplus, above current consumption, of about 50 million m^3 per year is still available, but softwoods only constitute one quarter of this surplus (2). The Provinces of B.C. and Quebec have already exceeded their AAC for softwoods (Figure 2). In simple terms we are presently dealing with a finite or diminishing resource, which cannot continue to withstand the increasing demands and/or requirements, of higher productivity sawmills. During the 1980's we have concentrated on building larger mills with higher throughput of commodity products. Faced with rising costs, enforced tariffs, environmental issues and fierce off-shore competition from low cost lumber suppliers in South America, our industry has responded with the development of some of the most cost-effective mills operating in the world today.

However, it now seems clear that the annual growth rate for softwood lumber markets around the world is declining. This together with the strong market shift towards the use of reconstituted wood or fibre products, clearly rings some alarm bells for the future of our commodity-based economy of softwood lumber. Another way of looking at this trend is by examining the world per-capita consumption of forest products, which also shows the dramatic shift away from sawnwood towards particleboard, fiberboard, paper and paperboard products (Figure 3)(3). This declining market situation, caused by the production of more lumber than the customer wants, has also contributed to a downward trend in long-term (1970-87) commodity lumber prices (in terms of constant dollars). This real price decline has occurred particularly strongly for narrow dimension, lower lumber grades, while values for select and clears in wide widths remain strong. This trend indicates the need for the softwood lumber industry to shift gears towards a product mix allowing the extraction of higher grade premium products for niche markets. An additional option available is the integration of the primary producing sawmills and specialty product manufacturers capable of adding value to lumber before it leaves Canada. Many sawmills in B.C. are already moving in this direction, supplying high value lumber to European and Japanese specialty markets.

This significant shift in our sawmill industry requires a strong commitment to developing new markets for added-value products and also to providing equally strong marketing and distribution programs for our

WORLD EXPORTS OF SOFTWOOD LUMBER

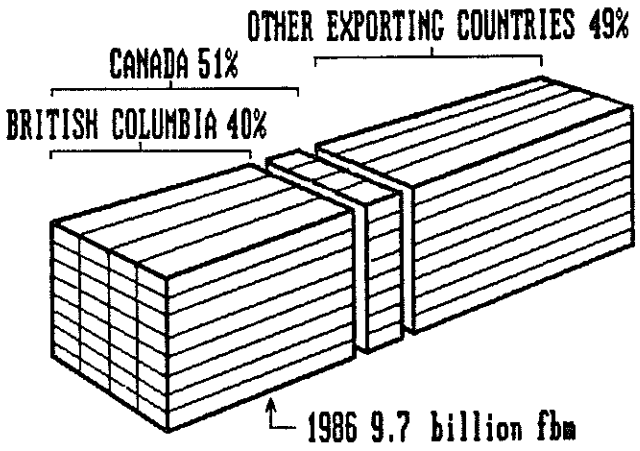

Figure 1 Annual exports of softwood lumber by Canada and B.C. relative to the total world export.

SOFTWOOD AVAILABILITY-1988

(MILLION m^3 PER YEAR)

	Annual Allowable Cut	Demand	Surplus
B.C.	79	80	-1
Quebec	33	35	-2
Ontario	27	21	6

Figure 2 Softwood availability for B.C., Quebec and Ontario, in 1989.

WORLD CONSUMPTION

(SOLID WOOD EQUIVALENT, m^3 / 1000 PERSONS)

	1965	1985
Fuelwood	338	237
Sawnwood	119	95
Plywood	8	9
Particle & Fibreboard	7	13
Paper & Paperboard	105	137

Figure 3 World per-capita consumption of forest products in 1965 and 1985.

Canadian sawmills. We must adopt a new philosophy and strategy for our lumber industry to survive and grow. We must:

"Produce what we can sell and not
Sell what we produce"
and we should make
"Value not Volume" our motto for the next decade into the year 2000.

THE THREAT OF PRODUCT SUBSTITUTION

In addition to our present problem of competing in world markets for sawn softwoods, we are increasingly under attack in the added-value market place due to substitution of alternate materials for wood. This has been documented clearly by Woodbridge, Reed & Associates in their 1989 FRDA Report 068 to Forestry Canada, "Substitution: the real threat to B.C.'s wood product sector"(4). They conclude that: "Substitution represents the potential for the eventual permanent loss of large, higher valued parts of sectors previously dominated by wood and can open doors permitting further encroachment".

As examples of this substitution consider the window and door raw material market for the U.K (Figure 4). In the ten years from 1975 to 1985 the market share for wood has dropped from 51% to 41% (4), succumbing to a huge 13% of the total market taken away by vinyl windows.

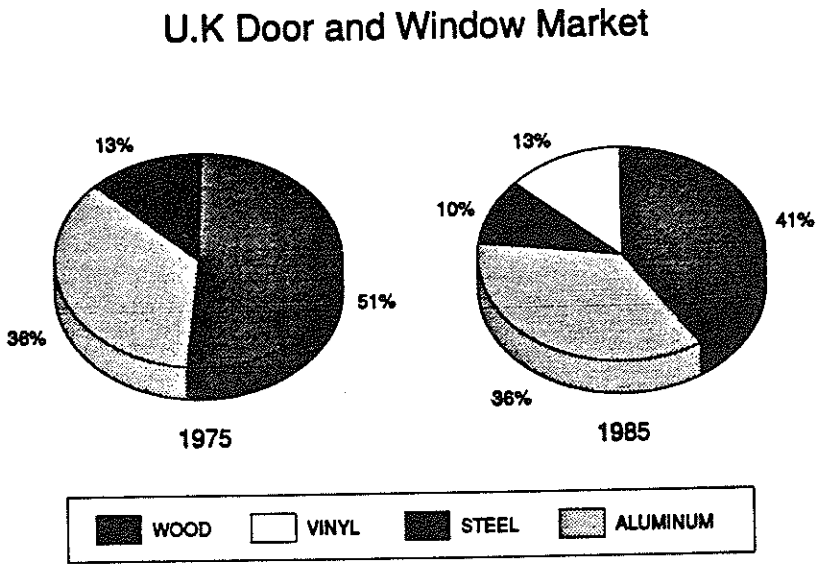

Figure 4 Relative utilization of wood, steel,vinyl and aluminum for the U.K. door and window market in 1975 and 1985.

Similarly in the West German window market from 1971 to 1983 (4) the market share for wood collapsed from 81% to 40%, while vinyl grew from 0% to 40% (Figure 5). It is interesting to realize that this enormous growth in vinyl windows was made with a higher cost product than wood. Clearly it was perceived to provide better value in terms of cost of installation, durability and subsequent maintenance.

It is no surprise that the above statistics also hold for the United States window raw material (Figure 6) market where, in 1982 wood occupied only 26% (4) of the market, the balance being made up of aluminum products (59%), vinyl products (12%), and steel (2%).

Turning closer to home, an example of product substitution can be seen in the replacement railroad tie market, where concrete ties increased their share of the total market from 12% in 1983 to 42% in 1986 (4).

And finally, as an example of an unsustained opportunity for softwood lumber, consider the timber frame housing market in the U.K. (Figure 7). By 1983 wood frame housing had secured 22% of the total new home market which, following the highly misleading and unfair TV series "World in Action", collapsed to about 5% in 1987 (4). In this case wood was portrayed as a non-durable, high fire risk product,quite unsuitable for the British marketplace. The fact that effective chemical treatments could negate these less desirable properties of wood was not made apparent to the consumer.

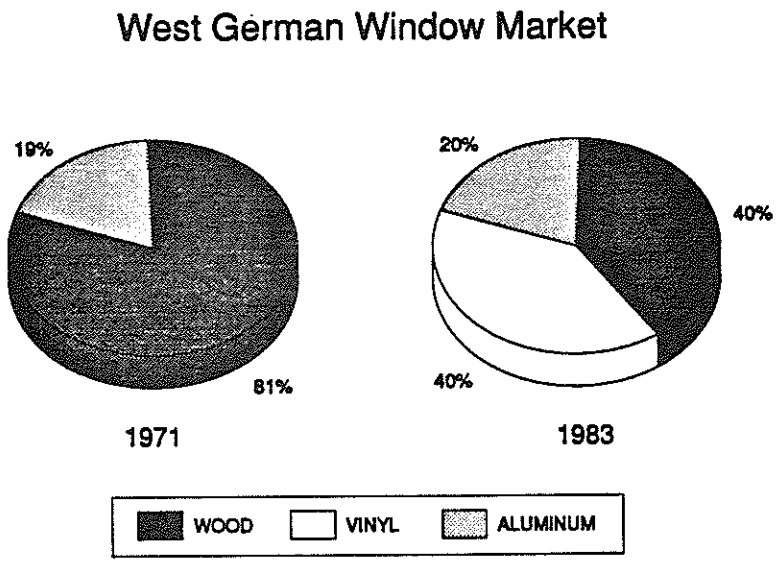

Figure 5 Relative utilization of wood, vinyl and aluminum for the West German window market in 1971 and 1983.

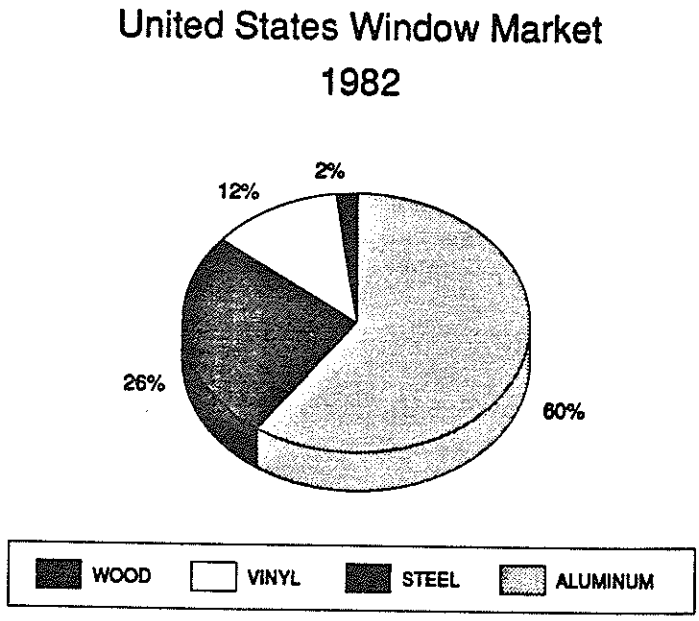

Figure 6 Relative utilization of wood, steel, aluminum and vinyl for the U.S. window market in 1982.

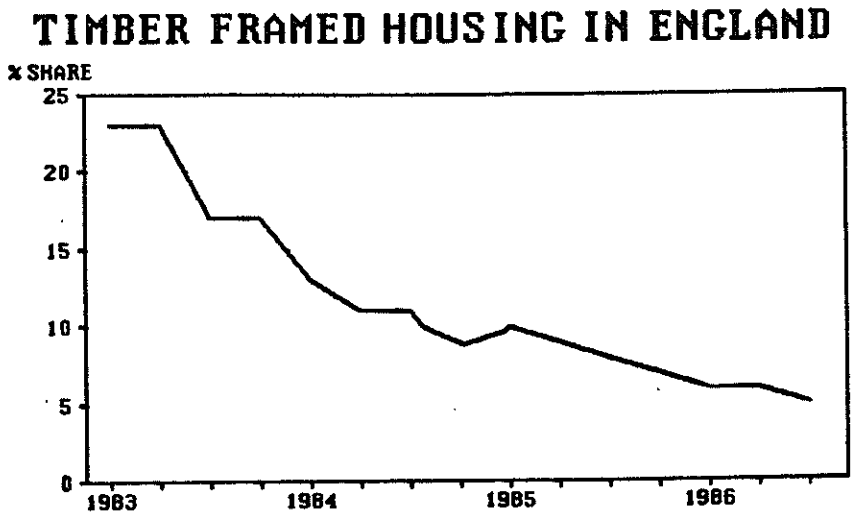

Figure 7 Percentage of the new housing starts held by timber frame houses in the U.K. from 1983 to 1986.

My intent in using the above examples is not to direct criticism or lay blame, but rather to highlight the need for very powerful, expensive, and realistic, marketing and sales programs for our future value-added ventures. What we have done in the past is not enough and we must commit ourselves to winning and not losing to substitute materials. We must consider wood as a scarce and expensive natural resource essential for the continued healthy growth of the Canadian economy.

ADDING VALUE TO LUMBER TODAY

I have chosen several examples of successfully developed or developing ways of adding value to softwood lumber and it is no coincidence that wood preservation plays a role either directly or indirectly in all of these.

WOOD PRESERVATION

Wood preservation is a well established, highly market driven industry, requiring a relatively low degree of technical sophistication and a relatively low labour commitment. It has developed from a firm research base and is supported by well accepted codes and standards developed in Canada (CSA080) and other countries.

The preservation industry in Canada has shown excellent growth over the past decade, (Figure 8) where from 1982 to 1986 the value of shipments and goods of our own manufacture went from $166 million to $250 million (5),

CANADIAN PRESERVED WOOD PRODUCTS

(MILLIONS OF DOLLARS)

	1982	1986
Manufactured Value	166	250
Value Added (Includes labour)	61	73

Figure 8 Growth of the Canadian wood preservation industry from 1982 to 1986.

an increase of over 50% in four years. For 1986 the value-added component (value of shipments minus the costs of material, supplies, fuel and electricity) was about $73 million which when the cost of wages and salaries is also subtracted, represents about 17% of manufactured value. Of this $73 million it is probably a good estimate that about $50 million was generated from lumber alone. Another way to look at the success of the wood preserving industry in adding value to wood products is to divide the value added dollar by the man-hour required to produce it (Figure 9). The wood preserving industry at $28.58/man-hour, comes out ahead of sawmilling ($26.80), door and windows ($22.50) and cabinets ($18.92). Clearly wood preserving is highly cost effective.

The wood preserving industry in the United States also has shown spectacular growth over the past decade, particularly in the lumber and timber sector for the southern pine market (Figure 10). Production of treated lumber and timber from 1977 to 1984 increased from 1.5 billion fbm to 4.3 billion fbm, and to 6.3 billion fbm in 1987 (6). The lumber and timber component changed from 25% of total treated wood products in 1977 to 51% in 1984. It is remarkable that treated lumber and timber consumption increased by 187%, while lumber consumption in the United States declined by 30% during the same period. These figures clearly describe a very buoyant market and reflect a highly successful marketing strategy for adding value to lumber.

The boom in treated lumber in North America has been fueled by the residential retail and remodeling (R&R) market and the expanding concept of the do-it-yourself (DIY) market (Figure 11). In the United States

VALUE ADDED RELATIVE TO MANPOWER OF MANUFACTURE IN CANADA

	$/Hr.
Wood Preservation	28.6
Sawmills	26.8
Doors & Windows	22.5
Cabinets	18.9

Figure 9 Value added to the wood preserving industry, per manhour for 1985, relative to other wood products sectors.

U.S.A. TREATED LUMBER AND TIMBER PRODUCTION

(BILLION BOARD FEET)

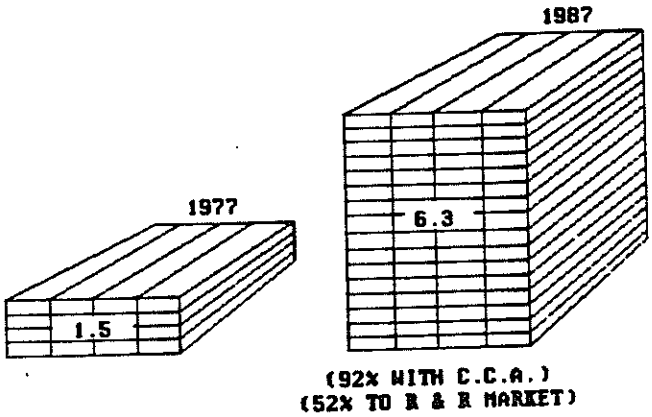

Figure 10 Growth of the U.S. wood preserving industry for southern yellow pine from 1977 to 1987.

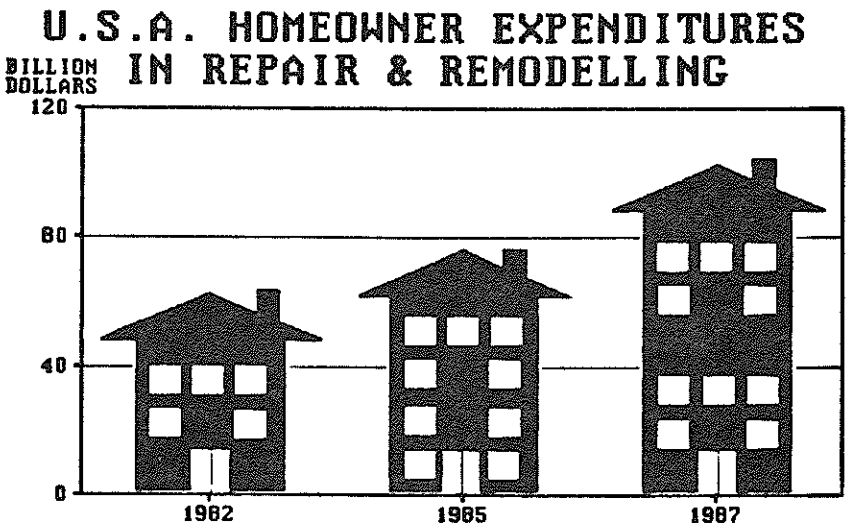

Figure 11 Growth of the U.S. residential retail and remodelling market for all products from 1982 to 1987.

expenditures by homeowners in the R & R market grew respectively from $62 billion in 1982, to $80 billion 1985 and to $103 billion in 1987. This R & R market now accounts for about 52% of the total market for treated lumber, which in 1987 was valued at $2.7 billion.

From the above data it can be seen how successful marketing and growth in the DIY and R & R area of the economy has resulted in a healthy demand for pressure treated lumber, resulting in booming sales of a successful added-value product. Although I have no similar data for Canada, there seems little doubt that the Canadian experience in this market is similar to that in the United States, with R & R and DIY pulling treated lumber use forward at record levels.

In the residential market place there are many examples of specific market niches penetrated by treated wood, such as preserved wood foundations, decking, fencing, landscaping, shingles and shakes, but all face the threat of product substitution and all must maintain powerful marketing strategies to combat this problem. The increasing activity of the environmental movement around the world will pose increasing problems for the producers and users of treated wood. Chemicals which are in some measure toxic in the environment will come under increasing pressure and regulation by public authorities. The effects of this can be extremely serious, as seen by the recent B.C. Waste Management regulations restricting sawmill stormwater run-off for pentachlorophenol to levels of 6 ppb and by next September (1990) for TCMTB and Cu-8 to levels of 15 ppb. One way out of these environmental problems will be to use wood preservatives which have extremely low environmental impact, for example

boron. Boron diffusion treatment of wet-heartwood species, such as hemlock and alpine fir, presents an opportunity for Canada in the export markets to Europe and Japan. A study by COFI (1987) suggests a potential market in the U.K. of 126 million fbm with 100 million fbm being new market penetration for hemlock windows, trusses, floor joists and wall framing. Boron treatment costs in Canada are estimated to be about 50% of the present light-organic-solvent treatment costs required under the National Home Building Council codes of practice in the U.K.

WOOD WINDOWS AND DOORS

Within Canada and for most countries of the world, wood has ben used traditionally for the construction of windows and doors. In 1986, for Canada, the shipped manufactured value of wooden doors and windows was just over $1 billion (8) with a value-added component of $450 million (excluding labour costs and capital depreciation).

This lucrative added-value niche for the use of softwood lumber has shown healthy growth since the early 1980's. Based on constant 1981 dollars, its total value has climbed from about $495 million to $568 million in 1986, and is forecast to reach $750 million by 1996 (9). During this time period the value of exports is expected to quadruple from $20 to $80 million.

During the years 1982 to 1986 the value-added component clearly illustrates the rapid expansion of this market (Figure 12), changing constantly upward from $194 million in 1982, to $450 million in 1986 (excluding labour costs and capital depreciation)(8). It is interesting that the value-added for the wooden door and window sector plus that from wooden kitchen cabinets, prefab building and wooden box factories, adds to about 33% of value added in sawmills and is more than twice that generated from veneer and plywood.

However, it must be remembered that all added value is not profit and additional operational cost are normally incurred by the producer, which the customer would be expected to pay. This applies to all of the examples given in this paper.

It remains an unfortunate fact that most of the major window manufacturers and some door manufacturers, purchase their lumber supplies in Oregon and California, where ponderosa pine is the preferred wood species and where security of supply has provided operational security. Some manufacturers are looking at the west coast of Canada as a future source of supply, which should provide significant benefits in material costs, particularly since these may run as high as 65-75% of production cost.

High quality western hemlock and lodgepole pine will provide ideal stock for joinery, but this involves post harvest protection, species separation and careful kiln drying, which have not, until now, been part of Canada's lumber commodity market strategy.

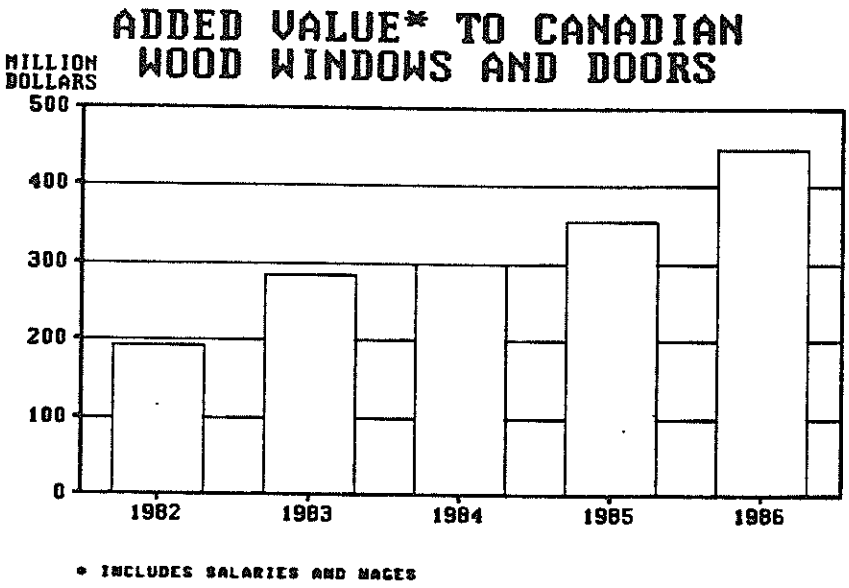

Figure 12 Value added to Canadian wood windows and doors from 1982 to 1986.

All softwood windows and exterior doors require some form of preservative treatment to provide the long term durability required by the marketplace. It seems probable that in Canada the conventional use of phenyl mercury oleate and pentachlorophenol will decline and give way to preservatives with less environmental impact, one of which could be boron, as previously mentioned.

SPECIES SEPARATION

The lumber industry in Canada is moving towards single species selling, particularly into high value market niches. The decline in sales of tropical hardwood furniture in Europe has created opportunities for Canadian softwoods, but the product must be of high grade and reliable in supply and distribution. In other words a commitment towards marketing a specialty product and not a commodity product. The development of lodgepole pine for the added value market is considered to be in its infancy. A recent case study presented in the Deloitte Haskens and Sells report (10) "A value strategy for B.C. solid wood products" (1988), compared a typical normal Interior B.C. mill cutting SPF with the same mill dedicated to lodgepole pine, and showed a 250% increase in profit from the lodgepole pine mill compared to the same mill using SPF.

Some treating plants across Canada are willing to pay premium price for pine separated from other species. This presents an added-value component to the sawmill. Forintek has developed various chemical agents that provide a colour reaction with the heartwood of various species, with a

95% accuracy. However, the methodology is slow and the search is on at Forintek to develop high speed, on-line, systems for species separation for lumber.

INCISING

Incising of most Canadian softwood species is required to provide the depth of preservative penetration and preservative retention required in the Canadian Standard CSA080. The situation in the United States differs significantly in that southern yellow pine (SYP) does not require incising and consequently constitutes the major lumber resource (80-90%) for the treating industry supplying the residential construction and R & R markets.

An added-value opportunity exists in Canada for the production of preservative treated SPF for export to the United States (Figure 13). The key to this development will be our ability to produce a product of consistent and acceptable quality to the consumer and which will always meet the American codes and standards for the species of SPF.

The U.S. treated lumber market is now running at about 6.2 billion fbm per year and a treated SPF product should be highly competitive in this market due to its quality, workability, dimensional stability, and price.

Treated SPF can be price competitive because, untreated, it is currently 80% of the price of SYP, its main competition. Chemical costs may also be slightly lower for treating SPF. Furthermore transport costs should be little different to those incurred by southern pine since the North East, North Central and Western United States annually "import" 1.6 billion fbm of treated southern pine from the U.S. South (11). Capturing just 10% of these regional markets would be worth around $80 million in sales.

A high density incising process will be pivotal for the successful development of this added-value market opportunity. Modern sharp-tooth incisors use a tooth density of about 6,000/m^2 and produce a surface appearance on green hem-fir which is acceptable to much of the Canadian R & R market. Forintek has successfully developed and patented a double-headed incisor with a total tooth density of about 12,000/m^2, which can be used with green SPF to produce a surface appearance which is little different from the unincised stock. A prototype of this incisor has already been built by BC Clean Wood Preservers Ltd. in Surrey, B.C. and trials are under way to evaluate its performance. Forintek has also developed a single head, high speed , high density, incisor, which could provide the technology for an SPF mill to produce "treatable lumber" at sawmill production speeds.

Further opportunities exist for preservative-treated SPF in off-shore markets, particularly in those developing in the Pacific-Rim countries. But again consumer acceptance will be dependent on quality, appearance, and long-term durability assurance. The latter will certainly involve resistance to termites as well as fungi.

TREATED LUMBER IN THE U.S.A.

Region	Production	Consumption	Surplus/ Deficit
N. Central	9.9	28.5	-18.6
N. East	6.1	21.1	-15.0
South	74.0	37.9	+36.1
West	10.4	12.5	- 2.1
	100%	100%	

Figure 13 Opportunity for Canadian exports of preservative-treated lumber to the North Central and North Eastern U.S.

KILN DRYING

In general terms kiln drying should be considered as a technology for adding-value to lumber. The product will certainly have greater consumer acceptance than unseasoned lumber; but does the net result of kiln drying result in an economic gain for the sawmill? Unfortunately the answer for many sawmills may be no, and the reasons are dependent on a large number of factors involving the source and species of lumber, sawmill operation, and availability of markets.

However, new technology for sensing the moisture content of lumber, provides an example of how the added-value component of kiln drying can be realized. In a recent study done by Forintek at Weldwood's Williams Lake Sawmill, using Forintek's new patented moisture sensor technology, the normal production of SPF was separated on-line into two parts, that above and that below the 35% moisture content value (12). The two parts of the production run were then separately dried and the grade outturn and recovery evaluated (Figure 14). Using this new technology an economic gain of 8.5 dollars/1,000 fbm or over $1 million/year was realized. This indeed is adding value to lumber.

Recent studies at Forintek combining the technologies of incising and kiln drying are under way and looking very promising, suggesting ways of adding even more value to lumber; for as surely as incising will allow better penetration of liquids into lumber, it should equally well facilitate the loss of water and drying of lumber.

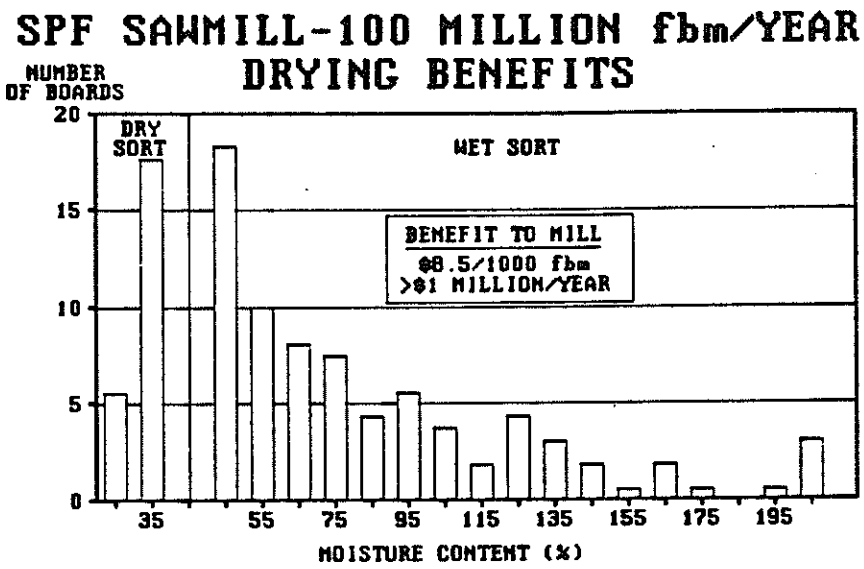

Figure 14 Benefits achieved by a B.C. sawmill using moisture sorting of lumber prior to kiln drying.

FINGER JOINTED LUMBER

Lastly in my perambulations in the field of adding value to lumber I have chosen a success story from the Interior of B.C., the use of finger jointing as a means of maximizing product yield and value from SPF.

Pinette and Therrien's sawmill at Williams Lake has been producing finger jointed lumber for 12 years and realizing the added value of this technology. By using suitable adhesives and when using green lumber, also using the technology developed by Forintek for pre-heating the fingers, high strength adhesive joints can be manufactured at high production rates. By using short lengths of kiln dried studs (below 5 ft.), which normally would go to the chipper, Pinette & Therrien have created finger jointed studs with premium value on the market place.

Through energetic and careful market development, finger jointed studs occupy 70% of the market niche for new houses built in Vancouver today. Builders like the product because it is consistently straight and of high wood quality and dimension. No more warped studs and nail popping for these builders.

For a successful SPF sawmill, using short lumber pieces with a chip recovery value equivalent to $45-55/1,000 fbm, with finger joint production costs of about $80-85/1,000 fbm and planing costs of about $15/1,000 fbm, the economic benefits are clear in a market where studs sell for about $240/1,000 fbm. The finger jointed studs may also command a price premium because of their consistent high quality.

Another sawmill in B.C., The Pas Lumber Company, is also successfully using finger jointing to add value to lumber, but in their case concentrating on the lucrative, structural, lumber market with lengths up to 40 ft and widths ranging from 4 to 12 inches.

CONCLUSIONS

It is clear that the Canadian wood products industry in the next decade is facing the problems of a diminishing resource and a decline in demand for commodity products. One of the opportunities available to alleviate these problems is to develop added-value processes for our lumber products. Remember the motto as we approach the year 2,000, "Value not Volume". However, there must be a realistic relationship between suitable technology, product and markets.

I think that this has been summed up most succinctly by my colleague, Dr. Al Schuler, in a recent paper that he presented in Edmonton (13), and I quote: "In essence, customer needs and markets is the key! Technology must have a market orientation, with products not an end in themselves, but the
means of satisfying customer needs or desires. The product becomes the carrier of the technology and the form it takes is defined only after the technology and need have been clearly matched".

I hope that the examples given in my address today exemplify this concept and show how our Canadian industry can, and in many cases already is, adding-value to lumber. It is for all of us to use our collective ingenuity, marketing skills and innovation, to maintain our Canadian wood products industry at the leading edge of world markets as we move into the next century.

Finally I would like to thank CWPA for the honour and opportunity to be here at this 10th Annual meeting today and especially to you, my audience, for your attention and consideration.

Lastly I am greatly indebted to many of my colleagues at Forintek who have helped to provide information for my presentation, especially Dr. Al Schuler in the area of economics and Dr. Paul Morris in the area of preservation.

Thank you all.

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