FRDA REPORT 045

THE STATUS AND DIRECTION
OF THE
LUMBER MANUFACTURING SECTOR
IN BRITISH COLUMBIA
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LUMBER REMANUFACTURING SECTOR
IN BRITISH COLUMBIA

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1. Introduction

The continued decline in real prices for commodity grades of lumber has focussed attention on the need to produce other grades and products. These products can either be developed directly at the log conversion stage (primary manufacturing) or at a number of subsequent processing activities. The following analysis addresses a sector that is an important and integral part of the activity that aims at increasing the value of, and the profit to be made from, the BC forest resource.

The remanufacturing sector of BC is currently a hot topic receiving a great deal of attention from industry, governments and labour alike. It offers the potential for increased profit, expanded industrial activity and additional jobs.

A major problem facing any analysis of this sector lies in the great diversity of its activity. There are effectively no precise data on what it does—in terms of value of shipments, volume of raw material processed, people employed or even the number of establishments. Similarly, it has always proved difficult to define, properly, just what is included and what is excluded as part of the primary sawmilling industry or part of the final product manufacturing industry (e.g. furniture, prefab housing, doors, pallets, and so on).

Every previous analysis of the sector has spent some time wrestling with definitions and each has produced something a little different. Rather than develop yet another definition, this report simply assumes that the remanufacturing sector has some form of lumber as a raw material and produces a product that will usually be subject to some further processing activity prior to final use. A list of some of the definitions that are in current use is attached in Appendix A.
2. Scale of Importance and Trends

Estimation of Scale of Remanufacturing in BC

The data available for the volume of remanufacturing and the number of people employed, fail to describe a complete or very meaningful picture. Statistics Canada data given in Appendices B, C and D use coarse and traditional groupings of plant type and fail to define or attempt to identify the degree of overlapping in those groupings of many plants. The most recent published Statistics Canada data on the Annual Census of remanufacturers (catalogue 35-250B) is for 1985 and are hardly relevant for investment decision making in such a fast moving sector. Similarly, confidentiality rules require Statistics Canada not to disclose many data when the sample size (e.g. few companies reporting) may identify individual companies. This means no data are displayed in BC Statistics' for 2 of the 7 plant categories shown, and severely limits meaningful analysis of the reman sector. Other factual data on the reman sector tend to be from miscellaneous and unaudited sources and probably do not use the same definitions on boundaries between categories. Similarly, data on the scale of remanufacturing tends to be in the form of isolated facts but not well defined time series of data, as are available in the primary lumber sector.

Some of these isolated facts or, in some cases, "estimates" are:

- In 1986, the BC Independent Lumber Remanufacturers Association (BCILRA) represented 33 members and associates employing 900 people, processing 315 million board feet per year.

- The BCILRA had 53 member companies in 1987 and is estimated to account for around 60% of the sector activity in BC. These members produce around $750 million/year of sales which would indicate a total of $1.2-1.4 billion sales per year for the BC remanufacturing sector.

- The 1984 Woodbridge, Reed report "Secondary manufactured solid wood products in BC" identified about 65 firms engaged in remanufacturing in BC, employing 1,800 people and consuming well over 500 million fbm per year.
* A recent press release from the BC government's Department of Economic Development identified a total of 135 independent "specialty product" manufacturers producing in the order of 1,460 million fbm per year at the end of 1987.

* In the Northern Interior Lumber Sectors (NILS), 1987 financial statements:

Shipments from NILS members in millions of board feet:

<table>
<thead>
<tr>
<th></th>
<th>1987 Actual</th>
<th>1988 Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary lumber</td>
<td>4,836</td>
<td>4,600</td>
</tr>
<tr>
<td>Remanufactured goods</td>
<td>61</td>
<td>90</td>
</tr>
<tr>
<td>Percentage of Reman to Primary</td>
<td>1.3</td>
<td>1.96</td>
</tr>
</tbody>
</table>

Note, however, that many of the remanufacturers in the Northern Interior are not members of NILS.

There is little doubt that each of these statements has taken a slightly different view of the sector. There does, however, appear to be an indication that the sector is growing.

**Relative Scale, Remanufacturing Compared to Primary Lumber Sector in BC**

In order to obtain some indication of the relative importance of the sector, the following figures are presented. Though it is known that the figures are far from precise, they at least provide an order of magnitude indication of the significance of the sector. Depending on which criterion is used, it would appear that the sector is around 5-15% of the sawmilling sector. It is probable that this percentage is currently somewhat higher.

(a) **Annual lumber throughput**

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>BC primary lumber sector</td>
<td>15.9 billion board feet/year (1987)</td>
</tr>
<tr>
<td>BC remanufacturing sector</td>
<td>1.46 billion board feet/year (1987)</td>
</tr>
<tr>
<td>Percentage</td>
<td>9.1</td>
</tr>
</tbody>
</table>
(b) **Employment**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Employees</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC primary lumber sector</td>
<td>29,001 employees</td>
<td>1985</td>
</tr>
<tr>
<td>BC remanufacturing sector</td>
<td>1,666 employees</td>
<td>1985</td>
</tr>
<tr>
<td>Percentage</td>
<td>5.7</td>
<td></td>
</tr>
</tbody>
</table>

(c) **Value of goods shipped**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Value</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC primary lumber sector</td>
<td>$4.032 billion/year</td>
<td>1985</td>
</tr>
<tr>
<td>BC remanufacturing sector</td>
<td>$0.66 billion/year</td>
<td>1985</td>
</tr>
<tr>
<td>Percentage</td>
<td>16.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Statistics Canada 35-250B SIC 2512, BCILRA estimates

3. **Rемanufacturing Representation in BC**

Two organizations represent the remanufacturing sector in BC.

a. **BC Independent lumber Remanufacturers Association (BCILRA)**

The BCILRA was created relatively recently (1979) and includes the majority of the larger companies. The Association has no premises or staff and its primary function is to provide a focal point to represent the interests of the sector.

A major objective of the BCILRA is "to promote the essential value of the lumber remanufacturing industry to governments, to all facets of the forest products industry and to the business community as a whole. In this role the Association provides liaison to primary producers, to customer, to governments and to the public in general".

A fundamental problem is the entrepreneurial and independent nature of the individuals who make up the remanufacturing sector. With a great variety of product, markets and manufacturing processes, it is not easy for them to develop common objectives.
b. Council of Forest Industries of BC

There are currently eight independent remanufacturers who have joined COFI. Though COFI is keen to provide all possible services to these members, it is inevitable that the emphasis of COFI's efforts must lie with the interests of the primary sawmills. It must avoid devoting a disproportionate amount of effort on behalf of a relatively small interest group.

State of Technological Evolution of the Reman Sector

Examples exist in BC of the extremes of sophistication in technologies.

Sophisticated scanning and mill wide computer decision making equipment, largely handed down and adapted from the medical and aero-space sectors in now employed in the primary sector, but has yet to make significant inroads into North American remanufacturing. Indeed, it is not yet certain what degree of sophistication in terms of computerization scanning, robotics, automation CAD/CAM/CIM, etc. is appropriate, either for the individual company or for the province.

As discussed later, a major problem faced by many in the remanufacturing sector in BC has been the lack of capital available to invest in the latest technologies. Instead, the companies have often relied on a great deal of ingenuity plus used equipment.

In Europe, several thousands of years of experience of furniture and cabinet making using skilled crafts people organized into guilds with father-to-son training has evolved into a hybrid of hand, machine and computerized machine manufacture.

Lead by West Germany, Sweden, the UK and Italy, a precision wood working machinery sector has built up, evolving from quality hand tools, through precision manually guided machinery, into scanning and computer-assisted optimizing machines. In addition to satisfying domestic and export demand for quality finished wood products, Europe has built up a leadership in advanced woodworking tool design, manufacture and export industry. In addition, the Europeans have pioneered many of the advanced remanufactured wood products such as:
• Trapezoidal lumber/boards such as "Okal" or "Wisewood"
• Plastic coated wood for exterior window frames - "Timberplast"
• Engineered I-beams with steel wiggle-strips as the web.
• Laminated veneer lumber - "Venla"
• Cement board with wood chips - "Duripanel"

Further, this edge in remanufacturing permits research and development whereby two or more technologies can be added in the same equipment or line of equipment and permits multiple benefits, along with sales of turn-key lines of equipment worldwide.

4. The Market Niches for the Remanufacturing Sector

A listing of traditional remanufactured wood products is given in Appendix E and the processes in Appendix F. Significantly more than half of the items listed are most suited for dense hardwoods--that is oak, maple, birch, etc.--which are in limited supply in BC and, in consequence, have not formed part of BC's traditional products. The comparative softness of BC's softwoods leads to poor wear and surface indentation resistance and hence severely limited application. Resistance to rot, too, is a limiting factor to the use of BC's softwood, though Western Red Cedar and Yellow Cedar (cypress), along with kiln drying and chemical preservation produce durable products.

Cedar traditionally accounts for over 50% of the species remanufactured in BC. Cedar is important since the Pacific Northwest contains the last significant natural cedar forests and cedar has unique properties for external use, is low in density and has an attractive colour and grain. The cedar shake and shingle sector is considered to be a specialty product and as such falls into the gray area between primary and secondary product categories, generally falling into the latter.
A key concept of all lumber processing which takes place after the primary breakdown is that the person downstream, including the final product user, is willing to pay more for a more refined product. As an example, take window frames. The new home purchaser wants fully finished, functional and technically sophisticated windows in his home and is prepared to pay. The house builder wants the minimum of on-site installation problems and wants a quality product that enhances the rest of the house. The window frame assembly (tertiary) plant wants the minimum of wood moulding, sawing and tenoning machinery and problems in order to focus on his assembly, painting, glazing and packaging operations.

Other benefits which accrue to the tertiary industry user of remanufactured products and which justify his paying premium prices include:

- No need for expensive machinery or for "cut and fit to suit" labour at final assembly;
- No waste such as sawdust and shavings or defective products to dispose of;
- No manufacturing dust or noise to have to accommodate in a clean assembly operation;
- More complete manufacture permits more of the internal hidden defects—such as knots and rot to be exposed, hence permitting more accurate value appraisal;
- Specification in the contract can guarantee against inaccurate sizing or products falling below minimum quality standards;
- Minimum levels of inventory since the remanufacturer can supply on a "just-in-time" basis to any of the tertiary producers' operations;
- "No-scrap" means no wastage in transportation. It also permits a precise order to be placed, rather than attempting to anticipate a level of scrap or end up with incomplete assemblies when the tertiary user had to remanufacture product himself.
The market place for BC's remanufactured products tends to be focussed on highly populated countries having post industrial economies, strong currencies, growing middle age populations able to afford improved levels of domestic shelter and furnishings, strong desire for natural products and image-enhancing quality consumer goods and living in countries lacking the raw materials. Japan and Europe (especially West Germany, the UK and France) are foremost markets for BC's products. The traditional major lumber market for commodity lumber, the US, also provides an attractive market for BC's remanufactured products. The California market, though more populous than Canada, is still, however, relatively poorly serviced by BC remanufacturers. Californians favour either varnished oak knock down or assembled furniture or dark stained heavy sectioned softwood furniture styles. BC remanufacturers are more familiar with Japanese and European preferences for natural light finishes of soft whitewoods typified by Sweden's IKEA furniture.

BC is ideally positioned at the radius of curvature focus of the industrializing Western Pacific Rim countries, who will soon develop increasing standards of living and be able to upgrade their domestic shelter and standard of comfort.

A major trend is to provide export specialty products for the Japanese and European (West Germany and the UK in particular) domestic shelter components markets. Products such as taruki (rafters) and laminating stock for window and door manufacture are in significant demand at attractive prices. Unlike commodity dimension lumber, these products are required in a very wide, but precisely defined, range of specifications such as specie, grade, grain-orientation, moisture content, cross section and length. Components are detailed in engineering drawings complete with dimensioning and tolerances--previously more usual in metal component manufacture.

New technologies such as wood densification, environmentally safe treatments for preservation and lowered fire resistance, and hybridization with plastics, metals will enhance the physical properties and durability of BC's remanufactured wood products.
The essence and attractiveness of remanufacturing lays in its ability to upgrade lumber by eliminating defects while at the same time generating the shape and product size desired. The primary lumber sector in BC focusses on producing and selling large volumes in long lengths (typically 8-24 feet) and wide widths (10 and 12 inches) of uniform lumber. In reality, the remanufacturer can identify smaller volume markets requiring shorts (less than 8 feet) and narrows and unusual size combinations. By carefully ripping (sawing lengthwise), and cross cutting to avoid areas containing knots or rot, a variety of smaller, higher unit valued items can be obtained from otherwise defective, low valued lumber. In addition, edge and face gluing and finger jointing all permit smaller pieces to be reconstituted into larger, more stable, pieces.

The primary sawmill focusses on volume throughput and is ill-equipped to provide the many cross sections, grades, patterns, etc. to satisfy a variety of window or door customers. The logical intermediary between sawmill and the window assembly plant is the remanufacturer.

Real Threat for Wood's Traditional Markets

The real threat in maintaining North America's primary and secondary wood markets comes not from competition by one wood manufacture with another, but from substitution by other materials--such as plastic or metals. These substitutions cause a permanent reduction in the wood remanufacturing sector. A major advantage of these products lies in the supplier's ability to provide precisely the component required to close manufacturing tolerance as opposed to a large piece of wood that must be reworked. Remanufacturing can offset this advantage. In addition, remanufacturing can help modify wood--by custom treating or finishing it in an appropriate manner--to ward off competition by substitution resulting from user dissatisfaction with wood. Wood's best defense against substitution is by highlighting its many positive attributes and minimizing its few negative attributes. Remanufacturing permits this enhancing to occur.
Examples where substitution has made successful inroads include:

- Railroad ties and utility pole in concrete;
- Pipes and flumes, minepit props, fences, gates, pallets and garage doors in steel;
- House siding and soffits in vinyl or aluminum;
- Mouldings, sports gear, toys, brush and axe handles and containers in plastic;
- Agricultural and small parts containers in plastic or corrugated paper;
- Moulded plastic cabinet doors;
- Metal entry doors;
- Vinyl and aluminum windows.

An interesting trend is occurring whereby traditional suppliers of wood products are "hedging their bets" by also offering plastic products. Examples of this include Weldwood's vinyl siding and soffits and Sauders plastics mouldings with simulated wood grain vinyl decorative overlay.

5. **The Problems Facing the Remanufacturing Sector**

(a) **Raw Material**

In contrast to the primary sector which generally has a secure long term supply of logs, the secondary manufacturer must rely on the purchase of lumber. Only rarely are these purchases made on anything but relatively short term contracts.

Some BC remanufacturers have found it necessary to have better control of their primary materials--by quality, price and deliveries--and have "backwards integrated" by acquiring a primary sawmill and even taking the double-step of acquiring standing timber and logging facilities to ensure total control.

A good example of this backwards integration occurred with Woodland Sash and Door at Prince George. Woodland Sash and Door found that the initial focus on only the marketplace and the equipment needed to manufacture their products was insufficient. It has now successfully "backwards-integrated" to gain access to its own raw materials--lodgepole pine--via a division called Woodland Lumber. A subsidiary manufacturing company, Scana Industries Ltd., produces kiln dried furniture components in lodgepole pine.
Conversely, major primary producers are now considering "forwards-integration" that is creating or acquiring remanufacturing facilities. An example of this is BCFP's recent acquisition of Wildwood Planers Limited at Maple Ridge and its reworking to create BCFP's Albion Division to produce resawn specialty items such as moulding, channel and bevel siding, from BCFP's primary lumber.

A common dilemma of remanufacturers is that they have, until recently, been a relatively minor customer of the sawmill. The focus of the established primary industry has been on high volume throughput and reduced costs. Where the logs can yield high grade lumber the sizes cut are those suited for export markets.

Since the BC reman sector is small in comparison with the export market, few large scale sawmills in BC are interested in cutting those specifications which could be used efficiently by the remanufacturing sector. In consequence, the reman sector tends to either:

* Inefficiently convert CLS and export sizes;
* Utilize shorts, mismanufactured products, splits, jags, etc.
* Purchase custom sized product from small sawmills.

or

* "Backwards-integrate" by acquiring its own sawmill and timber supplies.

The large variability in lumber sizes coming from small mills is frequently cited as a reason to backwards integrate. Planers, for example, cannot accommodate large variations in sizes between boards. By owning the small mill, supplies of acceptable materials can be assured. Unacceptable input material brings with it compounding problems of either preworking that material, or the cost of rejecting or disposing of the falldown. Similarly, the wide tolerance range of moisture contents permitted for construction lumber of 9-19% is far too broad for most remanufacturing purposes, which involve gluing, staining, painting, and continued drying out of such material in service would liberate stress cracking, cup and ring shake and similar unacceptable faults. For many remanufacturing processes and end products it is not possible to re-dry or wet and then re-dry this 9-19% moisture content material in order to achieve the two typical moisture content ranges, e.g. narrow band 8-10% and wide band 8-12%. The remanufacturer must, therefore, invest in and operate expensive dry kilns.
Remanufacturing Implies Primary Producers Made it Wrong

The term "lumber remanufacturing" tends to imply that the initial (primary) manufacturer did something wrong and hence the (secondary) remanufacturer has the task of correcting that mistake. In some senses, this is a correct connotation in that more value was left in the wood by the primary producer than he should have left--hence leaving sufficient value for the remanufacturing sector to exist.

The astute remanufacturer identifies his market niche and matches the tertiary users requirement with the most efficient primary product sourcing. He then installs the most efficient conversion and physical distribution system to satisfy the tertiary user.

(b) Investment

With a few exceptions, the remanufacturing sector lacks credibility with the investment community. There are some sound fundamental reasons. One is the lack of security of raw material supply. Another is the track record of the sector with numerous examples of failures--often due to underfinancing which in turn leads to lack of working capital, poor equipment and inadequate marketing. A more general problem is the difficulty faced by the potential investor or lender in undertaking any objective analysis of the enterprise.

External investors to any business sector expect to be able to obtain time series data on the remanufacturing industry's production and financial performance and listings of key companies, products, who's-who, much like the primary lumber. Also, information from trade associations, magazines, text books, equipment manufacturers brochures would support such investment, as would forest mensuration and product/market profiles. Surprising little data exists on a sector with such potential.

Offshore investors must wonder why in a province blessed with raw materials, energy and human resources, the remanufacturing sector is so poorly defined and so lacking in objective decision making data. Each investor is expected to accept 3 year old data as current and to have to recreate even basic time series of fundamental data.
Anomalies abound which defy logical explanation:

- A new Surrey window (tertiary) assembly plant which was unable to obtain supplies of high quality wood components from BC and is obtaining them from Sweden;
- Prince George area remanufacturers able to sell knock down components to furniture stores in Sweden;
- Examples of obsolete and labour intensive facilities surviving in BC while new facilities with high labour efficiency fail or move to Southern Alberta. A visitor to BC can be shown examples of the worst remanufacturing plants alongside those with elements of the best.

**Taxation**

Sweden is often identified as the leader which BC should follow in the whole area of "value added". The emphasis on the remanufacturing in that country is very significant. According to some statistics seen for 1985, 44% of all investment in the solid wood sector was devoted to remanufacturing. This figure was dramatically higher than the level for 1980, which was already an impressive 28%. No similar information is available for BC but it is highly unlikely to have been as much as 10%. One major reason has been the tax approach.

The Capital Cost Allowance (depreciation write-offs) favour continual upgrading of plant in Sweden compared with BC. At the same time, the personal income taxes on both investors/entrepreneurs and wood owning farmers in Sweden discourages them from investing or selling their wood. In consequence, the cost of delivered wood to the primary, and hence secondary sector in Sweden is far higher than in BC. High wood costs have encouraged exceptional effort to extract value in Swedish primary and secondary facilities.

**Technical Skills**

The remanufacturing sector is already suffering from the lack of skilled people to operate the plants. As the sector grows, this lack will become a greater factor.
BC abandoned the principle of technical training and indentured apprenticeships which are widely employed throughout Europe to provide a broad base of training and basic and fundamental research and development. Schools such as Rosenheim near Munich, West Germany, Rikssagverkskolan near Hammaro, Sweden and trade colleges in the UK provide hands-on experience on a wide range of primary, secondary and kiln drying equipment. In BC the "Catch 22" of "no experience so no job" exists. Remanufacturers state that experience obtained in sawmilling is often worse than no experience, since the sawmill philosophy towards volume throughput at the expense of quality or unique solutions goes counter to remanufacturing needs. Remanufacturers often cite their preference for female employees, based on the perceived attention to detail and desire for quality in the often monotonous, highly repetitive, short-cycle tasks involved.

It is certain that the primary sector will be employing fewer and fewer people. The volumes of harvest will not increase whereas productivity will. Inevitably, therefore, employment figures will decline.

The remanufacturing sector offers an excellent opportunity to create new areas of employment. Some will be in traditional processing operations but many will require greater expertise to handle sophisticated new technologies.

6. **Expansion Opportunities**

There is no realistic constraint imposed by the market place on expansion of the remanufacturing sector. Clearly not all the lumber processed in BC can be subjected to remanufacture into, for example, window stock. However, there are many market niches to be found and developed. Furthermore, a substantial amount of the fibre will still be profitably converted into commodity lumber. The expansion of the sector to the point where there is oversupply is unlikely in the medium term, provided that a diversified approach is taken.

The constraints to growth are internal to BC as explained in the previous section. There are a number of actions being taken to address these constraints.
Both the BC and Federal Governments recognize the many benefits to the provinces of adding value developing the remanufacturing sector:

- Employment creation;
- Extracting more dollars from our resource to provide tax revenues;
- Obtaining more wealth from a resource limited by Annual Allowable Cut (A.A.C.) considerations;
- Utilization of species and grades which only occur in the Pacific North Western region of North America;
- Recognition that the remainder of the primary growth forest contains grade, cross section, density and grain opportunities not found in the man-planted second growth forest;
- Diversification away from the traditional dependence on the North American dimension commodity markets for residential shelter construction materials with their cyclical demand and declining real product values;
- Growing awareness of significant competition, lower cost primary lumber producing areas such as Chile and Brazil;
- Stabilization of the economy of many smaller rural communities which presently rely on highly seasonal, cyclical or marginal sectors such as agriculture tourism, mining and fishing.

Some specific actions and programs under development are:

- **Raw Material Availability**

On September 15, 1987, the Honourable Dave Parker, Minister of Forests and Lands, represented a "new direction for forest policy in British Columbia". One of the three major initiatives of these policy directions is spelled out below:

"Comprehensive and far-reaching initiatives to encourage a competitive and more diversified industry in British Columbia. Program modifications will stimulate additional processing, developments in secondary and tertiary solid wood products manufacturing, and increased utilization of residual and specialty wood resources".

Woodbridge, Reed and Associates
One goal of the new stumpage appraisal system is to divert about 5% of the provincial harvest from the primary sawmill sector and make it available to the remanufacturing/secondary sector. Details of this program are as yet not resolved. Probably more important than the exact details like "which 5%" and "5% of what species and what grade" is the clear demonstration of the initiative of the Forest Service to encourage small-scale remanufacturers to start up. This, combined with the Federal Governments' Western Diversification programs of financial initiatives (W.D.O. and I.D.A.P.), are designed to smooth out the highly cyclical swings in an economy based on primary (wood) materials. These initiatives further recognize the need to permit job creation at the source of the materials and to stabilize the employment and economy of rural communities.

Another major goal of the new stumpage charge is to ensure that each purchaser of the provinces resources attempts to extract the highest possible value from each and every tree harvested. This new stumpage encourages the sawmiller to produce the most valuable product he can—and to extract the most saleable volume and grade—yield possible.

- Market Promotion and Product Development

A jointly funded program (Federal/Provincial/Industry) is under consideration. This program would be on the lines of the work done by COFI relative to lumber and plywood. Product promotion and development in the markets would be combined with assistance to producers regarding quality control, technology and raw material sourcing.

- Research, Development and Training

The Ministry of Forests and Lands in BC has initiated discussion with a broad spectrum of those involved in remanufacturing. The purpose has been to identify the common needs of the sector and how these may be addressed.

The general subjects of "value-added", "remanufacturing" or "further processing" have long been a subject of discussion but their significance, in practical terms, have been limited to such an extent that many have become skeptical about their potential reality.
These initiatives will provide the necessary impetus to move the remanufacturing sector to a much more prominent position in the forest industry.

7. **Future Directions**

The widespread application of available advanced technology and the introduction of evolving technology will transform the remanufacturing sector in a similar manner to that caused by scanning and computer optimization in the majority of BC's sawmills. The rate of change attributable to technology has been accelerated with time. Globally, the reman sector took thousands of years to progress from hand tools to machine tools in the late 19th Century. It then took less than one century to develop hand fed and controlled high speed precision machine tools. By the early 1980s external optical scanners and programmable controller style computers began to assist the human operator in decision making. Today real time computers can receive inputs from camera arrays and make optimized cutting and sorting decisions without human intervention. The next generation of equipment will employ combinations of technologies demonstrated and employed daily in seemingly unrelated sectors such as medical and aero-space. A major leap forward for the reman sector will come with internal scanning to examine the internal defects in wood and to permit sawing which avoids defects and produces the desired grain orientation for strength or appearance considerations. Once scanned, these data can not only route a component and its offcuts to the desired downstream equipment, but also assist in their decision making and load balancing. This, combined with robotics for pick-up, put-down, inspection, labelling, packaging and warehouse functions will lead to totally automated plants.

Just as today's car plant bears little relationship to its predecessor of ten years ago, we can expect dramatic change in remanufacturing in the next ten years.

Other advances will be in such areas as:

- Plant scheduling, order file optimization;
- MSR capable of operating to any international grading rules and optimizing breakdown for value;
- Laminating;
- Plastic coated moulding;
• Elimination of saw kerf and sawdust by application of laser and abrasive water jet cutting;
• In-line microwave drying;
• Laser incising and in-line staining, painting or environmentally safe treatments and preservatives;
• Extensive use of bar-code (Universal Product Coding – U.P.C.) of components for routing, inventory and for tertiary users;
• Automated machine adjustment to monitor and maintain tolerances and to reset for new products. This will also involve machine tool changes as tools become dulled;
• Hybrid products involving wood, metal and plastics assembled within the reman plant;
• Densification of the wood using softening chemicals and forging presses—examples include "Renova" and "Wstiwood".
APPENDICES
APPENDIX A

Added Value

The term 'value added' means, strictly speaking, the return to labour and capital. It does not necessarily mean 'profit added', nor does it necessarily apply to high value products. An operation buying very cheap economy lumber and selling finger jointed studs could add more value than one buying clear lumber and selling door stock.

Added value is a relative term--normal examples are of making furniture components worth say $1,500 per thousand board feet equivalent from $200 lumber--but also include manufacture of chips from trim ends.

Blank - A piece of lumber sawn to a size which requires final machining to convert it to a finished product or component.

Cant - A log with four sawn faces used for remanufacturing.

Component - A piece of dried and machined lumber ready for assembly into an end product.

Component Remanufacture

Component remanufacturers use equipment such as chop saw lines and finger jointing, edge gluing, staining and lacquering lines to produce finished or ready to assemble items such as furniture parts, window and door components, ladders and turning squares.

Forward-Integration

Forward-integration occurs when a primary sawmill puts in equipment to remanufacture or secondary process part of their primary production. This trend is more common in Sweden than Canada.
The converse, where remanufacturers or secondary manufacturers set up their own sawmills to produce cants, flitches or lumber is termed "backward integration".

Flitch - A thick board from which other boards can be sawn.

Further Processing

That processing taking place after the production of lumber and up to the creation of the finished product.

If drying and dressing is undertaken by the sawmill, then those processes are not deemed to be "further processing". If window frames are being produced, then further processing is deemed to be competed at the window plant finished goods warehouse, and would not include installation at a building site.

Lumber Upgrading

Lumber upgraders are typified by operations which rip, crosscut, dry and plane lumber to produce higher grades or sizes preferred by the end user. They tend to be high volume throughput operations and cater to the commodity market sector, rather than to a specific company as the end user.

Primary Manufacturing Sector - the sector that converts logs as a raw material into lumber including drying and dressing. The sector includes mills that also manufacture specialty products.

Product Upgrading

The simplest form of upgrading is to select, from standard specification production, lumber that can meet a more restrictive specification and which will command a higher value. Examples of this would be lumber with no wane or only with tight knots. Other examples of product upgrading would include treating or machine stress rating.
Remanufacturing

Remanufacturing is distinguished from sawmilling in that the raw material consumed is in the form of lumber, cants or flitches rather than logs. Remanufacturers can be distinguished from secondary manufacturing industries in that remanufacturers produce either lumber or components and semi-finished parts requiring further manufacture by secondary industries into final products.

Typical products include upgraded lumber, custom sized lumber components such as door and window stock, planed stock such as shiplap and decking, and small sized items such as pallet parts, kiln sticks, etc. The term "custom work" applies to remanufacturers in this area of work that perform custom machining, drying, etc., for a fee and they do not own the work in process.

Remanufacturing involves combinations of drying, resawing, cutting and trimming, finger jointing, laminating and gluing, and turning of wood components.

Secondary Manufacturing

Secondary manufacturing encompasses three identifiable sectors:

- Secondary manufacturing industries--producing items such as doors, cabinets, furniture components, pallets, etc.;
- Remanufacturers reprocessing lumber from one form to another;
- Primary sawmills who have "forward-integrated" into secondary manufacturing.

Secondary Manufacturing Sector - (or independent specialty product manufacturers) the sector that converts lumber as a raw material into a more finished state of lumber.
**Tertiary Manufacturing Sector** - the sector that converts remanufactured lumber items and components into finished marketable end use products such as doors, windows, furniture, pallets, etc.

**Specialty Remanufacture**

Specialty remanufacturers start with lumber, cants or flitches but employ more sophisticated machinery such as a moulder or profile planer to produce products for a more focussed market—items such as mouldings, panelling and siding.
### APPENDIX B

**Value of Remanufactured Goods Produced**

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Source: Statistics Canada, Cat. 35-2503

X = Confidentiality rules prevent disclosure
- = No data displayed

Note: Cedar shakes and shingles are considered here to be a primary not a secondary item.
### APPENDIX C

#### Remanufacturing Employment

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Source: Statistics Canada Annual Census of Manufacturers Catalogues 35-2508

Note: 1985 is the most recent year for which Annual Census figures are yet available

X = Confidentiality rules prevent disclosure
- = No data displayed
# APPENDIX D

**Number of Remanufacturing Establishments**

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Source: Statistics Canada - Annual Census of Manufacturers - Cat. 35-250B

X = Confidentiality rules prevent disclosure
- = No data displayed
APPENDIX E

Listing of Remanufactured Wood Products

Arches, wood laminated
Beams laminated wood
Beds or bunks
Benches
Bins
Boxes and barrels
Brooms and brushes
Cabinets
Custom millwork
Chopsticks
Crates
Desks
Displays
Doors
Fences
Flooring
Frames
Furniture
Handles
Hangers
Houses, prefabricated
Joists
Kitchen tools
Labels
Ladders

Laminated components
Lath
Letters and signage
Markers and stakes
Masts
Matches
Mobile home components
Models
Mouldings
Musical instruments
Oars and paddles
Pallets and skids
Paneling
Picture frames
Pipe, stove and culvert
Playground equipment
Play pens
Poles, utility, treated
Piling
Railing
Reel, wire and cable
Sash
Sauna
Scaffold
Shelving

Spindles
Sporting goods
Stairs
Tables
Toys
Trailers
Traps
Trays
Trellis
Trophies
Trusses
Tubs, hot
Turnings
Windows
Woodwork, Architectural
APPENDIX F

Typical Remanufacturing Processes/Custom Services

Custom reman
Resawing
Planing
Chop-line
Trimming
Sanding
Dry kiln
Edge gluing
Laminating
Finger jointing
Moulders/profiling
Wood turning
Veneering
Abrasive planing